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ABSTRACT

The Superconducting Super Collider Laboratory (SSCL) is a national lab for research on the fundamental forces and constituents of the universe. A major part of the research will involve an oval ring 54 miles in circumference through which superconducting magnets will steer two beams of protons in opposite directions. In response to the construction of the SSCL in North Central Texas, Navarro College and the Dallas County Community College District initiated a 3-year project to develop curricula to train entry-level technicians for employment at the facility and in other affected industries. This report describes the methodology and results of the first year of the project and reviews plans for the second and third years. The opening section details first-year accomplishments, which included: (1) using data from two regional Quality Work Force Planning Councils to design a computer database containing economic statistics, as well as information on the labor markets and educational programs affected by the SSC, representing the needs assessment upon which future curriculum development efforts would be based; (2) the preparation of a Curriculum Design Document (CCD) describing the steps involved in developing a specific curriculum; (3) the development of a prototype curriculum in Industrial Technology; (4) a listing of the SSC-related manpower needs; and (5) the completion of a cross-regional economic study. Subsequent sections of the report focus on second-year plans for updating the database and developing curricula; the database and updates; occupational areas for curriculum development; advisory committee recommendations; efforts to disseminate study findings; and third-year plans for the development and revision of curricula and training programs. Appendixes provide the CCD, the Industrial Technology curriculum, and additional supporting documentation. (PAA)

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Final Report for Year One of the:

Navarro College
Dallas County Community College District

SSC Project: Technical Training for the Future of Texas

Project No. 11140002

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July 1, 1990 - June 30, 1991

A Carl Perkins Funded Discretionary Project

JC920053

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Navarro College/Dallas County Community College District
SSC Technical Training Project

Final Report — Year One

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FINAL REPORT FOR YEAR ONE OF THE NC/DCCCD SSC PROJECT: TECHNICAL TRAINING FOR THE FUTURE OF TEXAS
A CARL PERKINS FUNDED DISCRETIONARY PROJECT

The Texas Community College System has been charged with meeting the needs of businesses and industry and with preparing the workforce for a changing economy and workplace. This suggests the need for information and planning systems that will enable educational institutions to be on the cutting edge of technological advances, providing timely technical and vocational education programs based on emerging or dramatically changing technologies and economic developments.

Governor Ann Richards expressed her expectations for community colleges in her address to the State Job Training Coordinating Council on April 8, 1991.

> Community colleges, TSTC, other institutions of higher learning are invaluable resources that must be well utilized.... And we must learn to anticipate needs and opportunities on our own. What should we be doing to train workers in anticipation of the superconducting super collider and the commercial applications it will generate?

To this end, the Navarro College/Dallas County Community College District SSC project has assumed the leadership role for all community colleges and technical institutes in the state to be proactive to the anticipated training needs of the SSC and its impact area. It is in keeping with the spirit and intent of the Carl Perkins Vocational Education Act and the goals listed in Area XII of the Texas Master Plan for Vocational Education (Emerging and Impacting Technologies, Occupations and Industries), as well as the expectations of the Governor of Texas and with the understanding that conscientious research and careful program design form the basis for a superior training delivery system.

The Navarro College/Dallas County Community College District Superconducting Super Collider Technical Training Project addresses this issue as it applies to the economic impact of the construction and operation of the SSC. During Year One of the Three-Year project, the staff has developed an educational information database that documents the need for curriculum development by identifying emerging technologies and occupations, their impact on the Texas workforce, and their significance for post-secondary applied technology education, training, and retraining. Year Two will update the database and develop three to five curricula based on the findings of the needs assessment. Year Three will pilot test, revise, and disseminate the curricula developed during Year Two; develop three additional training programs; develop equipment lists, student material, and teaching strategies for the curricula; and disseminate the information about this curriculum development model to industry, educational institutions, and government agencies for their use and replication.

GOALS AND OBJECTIVES FOR YEAR ONE

The Goals for the overall three-year project, as stated in the original proposal, are:

I. To identify emerging technologies and occupations, their impact on the Texas work force, and their significance for postsecondary technical and vocational education training and retraining.

II. To identify changes necessary to upgrade existing programs in impacted occupations, and provide program planning information to postsecondary technical and vocational institutions.

The Objectives for Year One and their time line for accomplishments are included at Attachment A. The end-products for the conclusion of Year One are as follows:

1. The development of a computer database of economic statistics, labor market, and educational programs of the North Central Texas area impacted by the Superconducting Super Collider Laboratory (SSCL) using data from INTERLINK and HOTLINK.
2. The development of a Curriculum Design Document.
3. The development of a prototype of the Curriculum Design Document (Industrial Technology Curriculum). (Institutional matching money instead of grant funds were used to develop this curriculum).
4. The listing of SSC related manpower needs.
5. The use of INTERLINK as the evaluation monitor of the economic study.

In addition, the project also has accomplished the following tasks in Year One:

6. A cross-regional economic study in cooperation with INTERLINK and HOTLINK Quality Work Force Planning Regions.

7. Identification of other related projects and collaboration of efforts to avoid unnecessary duplication of funds.

8. Organized a network of contacts and charted the multifaceted infrastructure of the national, state, county, local and private sector entities involved with the construction and operation of the SSC Lab (Attachment D).

DETAILED ACCOMPLISHMENTS FOR YEAR ONE

The following explains each of the accomplishments for Year One in detail.

1. The first accomplishment of the project for Year One has been the design of the computer database of economic statistics, labor market and educational programs for the SSC impact area as the needs assessment upon which to base any future curriculum development.

The computer database of economic statistics developed for the SSC project expands and enhances the Labor Market Information System (LMIS) labor demand data originally developed by INTERLINK. This has been accomplished using the same data resources and methods employed to produce the existing database. The December, 1990 Bureau of Labor Statistics (BLS) 790 data series of wage and salary employment has been used as the base for all industrial and occupational employment estimates and forecasts. These data are typically provided at the two-digit Standard Industrial Classification (SIC) code levels of analysis and require processing through standard matrices to produce 1990 estimates at three-digit SIC level of analysis, which the SSC project requires. This also requires adjustments to account for non-wage and non-salaried employment based upon information available from other secondary resources.

The annual forecasts for years 1991 through 2000, required of the SSC project, involved processing the BLS base data through a trend model that employs two critical exogenous variables:

oil prices and gross national product. The figures derived by this model has been reviewed by local economists and adjusted, as needed. (It is standard procedure to gather selected, practicing economists together who have general and specific knowledge of the area in order to tailor the economic estimates to the local region. The forecast model used only includes a general standard model and must be taken through this additional step. The board of economists met on July 26 and included:

Debbie Beck	TEC
Don Johnstone	TEC
Sam Webster	TI & INTERLINK
Jamie Villela	DCCCD
Charles Orsak	Navarro College
Heath Taylor	Navarro College
Art Ekholm	TU Electric
George Kelly	SW Bell
Jim Deegan	LPSC
Donna Parker	Fort Worth Chamber
CJ Westmoreland	H-GAC
Patti McGlohen	DCCCD
Robert Prejean	NCTCOG
John Bassler	Congruent Systems
Mark Hunt	Greater Dallas Chamber
Lyssa Jenkens	NCTCOG).

The matrices used to disaggregate the 1990 estimates were employed to produce the final labor demand forecast figures for both industrial and occupational employment of the SSC-impact area. The resulting industrial and occupational employment forecasts of the SSC-impact area, as a result of this project, have been fully incorporated into the modified LMIS labor demand module. This data was also disaggregated by county for the combined INTERLINK and SSC regions based upon secondary resources such as the Census Bureau's County Business Patterns. This phase resulted in the final products for the end of Year One:

— LMIS, version 1.2, with updated North Central Texas regional labor demand data, expanded to the year 2000.

— LMIS SSC Technical Training Project, version 1.2, with updated North Central Texas regional plus Hill and McClennan Counties labor demand data, expanded to the year 2000.

— Dbase diskware presenting county-level labor demand data.

The forecasted annual labor demand attributable directly and indirectly to the construction and operation of the SSC—as required by this project—have been derived through North Central Texas Council of Governments (NCTCOG) Data Center's analyses of readily available secondary data resources pertaining to the SSC. Relevant documents have been acquired directly from the projects and all associated agencies, such as the North Texas Commission and the Department of Energy. Personal interviews of the authors of these documents, as well as other knowledgeable individuals and consultants, have been conducted, as needed, to explore the underlying data resources, assumptions, and methodologies.

The information provided by the various resources has been independently evaluated and analyzed to derive at the SSC forecasts required. This project has also employed the State Input/Output model, provided by the State Occupational Information Coordinating Committee through their automated labor market system (SOCRATES), in the development of these forecasts. This ensures consistency with the State process.

All SSC-related labor demand forecasts have been processed to both the most detailed SIC level of industrial and Occupational Employment Statistics (OES) level of occupational analysis. The final estimates of SSC directly related jobs and indirectly related jobs have been processed in Dbase diskware. The final product for this phase of the project has been: Dbase diskware presenting SSC direct and indirect regional employment estimates by occupation for the ten year period covering the SSC construction—1990 to 2000.

Community college and technical institute data also have been included in the database. The program completer data for all community college districts (CCD) and technical institutes (TI) in the state of Texas have been collected for the latest year available from THECB. The data have been provided to the project through supplemental diskware. The LMIS occupational evaluation model, which crosswalks occupational and training information, has been updated to include any CIP or OES data not presently covered. The final product for this phase has been: Dbase diskware presenting program completed data with outcomes for each CCD and TI in Texas.

The database developed for the NC/DCCCD SSC project has included a list of employers within the nine-county SSC-impact area. The standard matrices used to convert industrial employment to occupational level data have been used to identify potential employers of persons in occupations affected by the event of the SSC. Data for the specific firms identified in this process have been extracted from the Zeller and Letica employer files provided by the State as part of SOCRATES. [Zeller and Letica are economists contracted by the State of Texas to provide lists of employers in each Texas region. They have included employers of ten employees or more and have provided this information through the State Occupational Information Coordinating Committee (SOICC) and SOCRATES, the Input/Output model from the State Comptroller's Office—another example of the project's widespread linkages and coordination. These files list all employers of ten or more in the nine counties of interest. The SSC project is fortunate in developing this linkage which would have been financially prohibitive if it had had to be contracted through the SSC project.]

The information collected for the final employer list includes the following: firm name, address, city, county, zip code, primary SIC code, employment size, and phone number. Contact names have been provided where available. The presentation of this data details the SSC-related occupations likely to be associated with each firm. The final product for this phase has been: Dbase diskware containing employer mailing lists.

All data resources, methodologies, and software products developed by NCTCOG Data Information Center for the NC/DCCCD SSC Technical Training Project, have been fully documented. To the knowledge of the project staff, this is the first time that community colleges have networked with government, business, and industry to create compatible and jointly useful data affecting curriculum planning and program development. Further, an Executive Summary of the research results has been produced as a separate document to this report.

The computer database of economic statistics, labor market and educational programs for the SSC impact area is available through this project.

2. The project has developed a Curriculum Design Document. The Curriculum Design Document developed by this project is enclosed as Attachment B. The procedure includes utilizing the DACUM process for curriculum development. This process was approved by the Advisory Committee on August 29 as the process by which to develop 3-5 curricula during Year Two of the project.

3. The project has developed a prototype curriculum based on the Curriculum Design Document. The Industrial Technology Curriculum, developed by Navarro College over a fourteen month period and used in this project as matching funds, is the prototype curriculum developed based on the Curriculum Design Document. It was developed with the help of ten SSC division chairs who served on its advisory committee. The Industrial Technology Curriculum is attached to this report as Attachment C.

4. The project has identified SSC-related manpower needs.

This PC-driven database documenting the need for technical training in the North Central Texas area impacted by the SSC has been completed. The results of the findings are as follows:

County Level Labor Demand Data: Dallas and Tarrant counties account for the vast majority of employment in the 18-county North Central Texas (NCT) region, capturing 59 percent and 24 percent of the total, respectively, followed by McClennan, Collin, and Denton Counties capturing another 11 percent combined. The nine-county SSC region of influence—Dallas, Ellis, Hill, Johnson, Kaufman, McClennan, Navarro, Rockwall, and Tarrant—captures 90 percent of the 18-county labor market.

SSCL Direct Employment Effects in the NCT Region: The direct employment effects of the SSCL over the ten-year construction phase indicated new employment for 27,000 full-time equivalent personnel. These were grouped into five major employment occupational areas:

A. Management/administration,
B. Professional,
C. Technical,
D. Clerical and other support staff, and
E. Construction crafts.

This portion of the study revealed two of the most important immediate results of the project. First, the majority of employment within the construction crafts is covered by the Davis-Bacon Act which mandates that "prevailing" wage rates be used in federal construction projects as determined by regularly updated Department of Labor surveys. Although this does not mandate unionized labor, there is a perception that it may result in such. This means that the community college system in Texas must consider apprenticeship training for these trades.

The second finding is that the SSCL direct employment effects promise to exert pressure on occupations that are already in high demand in this region: managers, secretaries, engineers, and technicians. These occupational groups were specifically targeted in the 1990 Quality Work Force Planning efforts as the first, second, eighth, and ninth ranked employment fields in NCT.

Each of these occupational groups require specific training beyond high school, and the pressures added by the SSCL indicate that even greater attention is warranted in developing the region's educational and training program capacities.

SSCL Indirect Employment: The majority of indirect employment generated by the SSCL in the ten-year construction phase will be directed towards the household or consumer sector of the economy. The identified occupational groups performing consumer services directly are health, sales, food, and household workers, accounting for over 40 percent of all indirect SSCL employment. Typically, these occupations capture approximately 25 percent of the total regional economy. Further, many of the SSCL's indirect management, professional, clerical, and other support workers will be involved in the businesses providing personal consumer services, and most of the construction employment will be in the residential sector. The SSCL's indirect employment bias towards the consumer sector is further evidenced by the relatively low proportion of general professional and production workers, at less than 7 percent, compared to the regional figures of over 18 percent.

North Central Texas Employers: Over 9,000 NCT firms likely to employ workers in occupations significantly affected by the event of the SSCL were identified for this project. The employer data contains firm name, location, phone number, employer and SIC code information and is formatted in Dbase disk files. This information is important for curriculum development, because any training programs developed by community colleges for the SSCL must be broad-based to fit training requirements of similar employment opportunities.

Vocational Education Program Completers: Statewide community college and technical institute vocational education program completers were inventoried to help assess the training resources and needs as the SSCL impacts the Texas labor market.

INTERLINK's HOTLINK's LMIS for the SSC Technical Training Project: INTERLINK's and HOTLINK's PC-based LMIS software shell was adapted to the needs of the SSC Technical Training Project data to maximize both the access to and linkage between the labor demand and supply data developed in this study. The advantage is that the module links the occupational level data to both directly and indirectly related vocational education program completer figures. It also provides additional detail on the training, wage, and replacement characteristics of each occupation inventoried in the labor demand modules.

5. The project contracted with INTERLINK as the evaluation monitor for the economic study. In response to a concern raised by the THECB in February, the project amended its contract with INTERLINK to include "monitoring" in the services to be provided. This was in an effort to avoid duplication of any activity INTERLINK was mandated to provide and thus ensure the NC/DCCCD project would "expand and enhance" the LMIS system as stated in its proposal.

In addition to the five accomplishments originally proposed and discussed above, the NC/DCCCD SSC Technical Training project has attained three additional achievements.

6. A major additional accomplishment has been to perform a cross-regional economic study in cooperation with INTERLINK and HOTLINK Quality Work Force Planning Regions. As a result of the efforts of this project, coordination between INTERLINK and HOTLINK was established to include economic and labor data for McClennan and Hill counties in the SSC project database.

7. The project has been able to identify other related projects and to collaborate efforts to avoid unnecessary duplication of funds. As the project began its research, it was discovered that there were several projects with similar goals. None, however, addressed the needs of the community college nor the training needs for technicians. This project soon identified the voids in these studies and concentrated its efforts on filling them. Some of the studies that have provided useful information to this project have been: the Ellis County Planning and Zoning Commission study conducted by Johnson, Johnson, and Roy to identify ancillary services within Ellis County; the LMIS developed by INTERLINK; and the THECB Community College and Technical Institute Database of Programs and Completers. The project also reviewed similar socioeconomic studies from other projects, such as NASA, Fermi Lab, Argonne National Lab, and Brookhaven Lab.

8. One of the most important achievements of this project has been to become a part of the network of contacts and to chart the multifaceted infrastructure of the national, state, county, local and private sector entities involved with the construction and operation of the SSC lab.

The majority of time and effort spent on the project in Year One has been to identify the key elements in the SSC arena and to be recognized by the infrastructure of the SSC, the Ellis County Chambers of Commerce (CC), the Ellis County Planning and Zoning Commission (ECPZC), the Ellis County SSC Forum, the Ellis County Personnel Association, the Department of Energy (DOE), the Texas National Research Laboratory Commission (TNRLC), INTERLINK, North Central Texas Council of Governments (NCTCOG), the North Texas Commission (NTC), and the Small Business Development Centers (SBDCs). In addition, major subcontractors, such as Parsons Brinckerhoff/Morrison Knudsen, General Dynamics, and Westinghouse, have been contacted and have agreed to cooperate in identifying manpower needs and developing curricula where possible. General Dynamics will be manufacturing dipole magnets in Hammond, Louisiana. Hammond Technical Institute will be developing a curriculum to train local job prospects to work at that plant. Westinghouse will be manufacturing dipole magnets in a similar plant in Round Rock, Texas. The SSC project has been contacted by Westinghouse and has agreed to help Hammond Institute in developing the curriculum in magnet technology. This curriculum will also be used by the SSC project to train local manpower for the Magnet Development Lab in Ellis County). This type of cooperation between business and education is vital to identifying and developing high tech training programs for emerging occupations. Attachment D illustrates the network of contacts developed for this project.

METHODOLOGY FOR YEAR ONE

Year One Activities have been directed by: **1)** a joint staff between Navarro College and the Dallas County Community College District, **2)** a steering committee of chief administrators from both institutions, **3)** an educational task force, and **4)** a business and industry committee. Lists of these personnel and project organizational charts are included at Attachment E.

The advisory committee met on April 22 and again on August 29. The steering committee met as needed. In addition a board of economists met on July 26 to validate the manpower projections made by the economic study for the curriculum needs assessment/database.

DIRECTION FOR YEAR TWO

The pivotal meeting for the NC/DCCCD SSC Technical Training Project occurred on August 29, 1991, with the convening of the Project Advisory Board. Its purpose was to review the accomplishments of Year One and to give guidance for Year Two. The following is a discussion of what took place and the recommendations for Year Two.

The advisory committee was convened to:

1. Present a demonstration of the database.
2. Present and finalize the curriculum development document/plan.
3. Identify, finalize, and prioritize the 3-5 curriculum areas/programs and delivery modes the project will concentrate on during Year Two, curriculum areas to be chosen from the following areas:
   - A. magnet technology
   - B. cryogenics
   - C. vacuums
   - D. CAD
   - E. engineering tech
   - F. secretarial/management support to include:
     1) Macintosh
     2) Excel
     3) Windows
     4) terminology, etc.
   - G. detector technology
   - H. construction trades
   - I. general maintenance
   - J. computer programming assistant
   - K. composite materials
   - L. protective services
4. Approve the final report for Year One of the project.
5. Discuss/confirm the objectives and time line for Year Two.
6. Request a comparative study be done between Batavia, IL and North Central Texas to identify potential educational opportunities which will be made available to the area by the event of the SSC.
7. Set schedule for Year Two advisory committee meetings

DISCUSSION OF DATABASE AND UPDATES

The following items concerning the database were discussed by the Advisory Committee and are listed in random order:

1. At present the purpose of the database is for curriculum planning. The Committee suggested the project staff explore the expanded use of the database, possibly to include its utilization as a tool for student career counselors. They agreed to explore this.

2. The data projections used in the database were evaluated by an independent board of Economists on July 26, 1991.

3. The database should be updated during Year Two using 1990 census data which will not become available until 1992 and beyond. This would allow the database to be as up-to-date as possible for curriculum planning over the three-year course of the project.

4. The craft codes and titles for the SSCL staffing pattern are being revised and condensed. These new codes, when available, should replace the current listing in Appendix D of the report and in the database.

5. There are many uses for this database. Some of the government agencies and industries represented at the meeting wanted the database demonstrated to their procurement personnel and planners.

6. The project staff should explore ways the database could be useful to the two Tech Prep projects in this area. The staff agreed to do this.

7. The Committee briefly discussed the potential of the database as a clearinghouse for manpower supply and demand, educational program offerings, and economic and training planning.

8. There was preliminary discussion on whether to perform a comparison study of the growth pattern of the Batavia area in Illinois, due to its hosting two national research laboratories, and the anticipated growth in the NCT area with the event of the SSCL. One person asked why this would be important to the project. Another answered that if the comparative study indicates the impact on educational programs the Batavia growth affected, then the study would have relevance to the NTC and SSC Technical Training project. Another indicated that such a study would help validate the findings of the economic study just completed in the SSC Technical Training Project. No decision was made by the Advisory Committee on the comparative study.

OCCUPATIONAL AREAS FOR CURRICULUM DEVELOPMENT

As determined in the economic study, the five occupational areas most affected by the SSCL were:

A. Management/administration
B. Professional
C. Technical
D. Clerical and other support staff
E. Construction crafts.

1. The Advisory Committee did not discuss the management/administration area in view of curriculum development.
2. The Committee felt the professional positions required higher levels of education than those community colleges can address.
3. The Committee also heard a discussion of the need for apprenticeship training in relationship to the construction crafts. This is an area in which Texas community colleges need more work, and this information is vitally important to convey to the community college system throughout the state. The project staff agreed to explore the area of apprenticeship training during this year.
4. The Committee concentrated its discussion of curriculum development in the areas of a) technical and b) clerical support.

Technical

The Committee discussed the following technical areas to be considered for curriculum development and upon which to perform a DACUM:

1. **Radio Frequency Technology**. There is a great need for radio frequency technicians, especially those with training in analog versus digital. SSC staff are concerned that the high demand for RF technicians might lead to hiring these personnel from other national labs. This is not something the SSCL wants to do. Dr. Curtis Johnson reiterated the importance of this type of technician, based on his interfacing with the SSCL over the past several years.

2. **Computer Science/Detector Technology**.. The demand for technicians trained in high tech computer science and detector technology is great. This training should include knowledge of the Research and Development process and skills training in UNIX.

3. **Cryogenics Technology**. This area of concentration needs to be addressed for technician training.

4. **Magnet Technology**. This area has been discussed in relationship to the recent contracts awarded to General Dynamics and Westinghouse, the primary and secondary contractors to actually manufacture magnets. General Dynamics will establish a plant in Hammond, Louisiana, and Westinghouse will establish one in Round Rock, Texas. A third firm--the Superconducting Cable and Engineering Company (SCE), a subsidiary of DOUR Company in Belgium--is establishing a plant in Waxahachie. Project staff have contacted each of these institutions, plus Hammond Technical Institute (HTI), and Austin Community College (ACC). HTI and ACC will train local manpower to work in the plants in their respective areas, and Navarro College will help with th SCE Company training needs in Ellis County. The SSC Technical Training Project will assist in the development of a 160-hour contract training curriculum in magnet technology which will be mutually beneficial to Navarro College, Hammond Technical Institute, Austin Community College, General Dynamics, Westinghouse, and the Superconducting Cable and Engineering Company.

Clerical

The most animated discussion from the Advisory Committee was about clerical support. Based on his interfacing with the SSCL this summer, Mr. Leerskov identified a hybrid staff position he entitled a Documentation Specialist. This person would be able to support management as well as engineering and factory divisions. The curriculum would include knowledge and skills in technical writing/graphics. The committee liked this concept and emphasized that the curriculum should include statements about reading levels, conceptualization, and creative thinking. It should also present awareness of various software packages, but especially software concepts. Comments about the importance for such a position were made from the SSCL staff, PB/MK, representatives from industry, and representatives from INTERLINK.

SUMMARY AND RECOMMENDATIONS OF THE ADVISORY COMMITTEE

Recommendations made by the SSC Technical Training Project Advisory Committee on August 29, 1991, as closure for Year One and as direction for Year Two are summarized as follows:

1. The LMIS database should be accepted as presented and updated during Year Two to include 1990 census data and revised SSCL manpower staffing figures.

2. The curriculum process to be used during Year Two to develop the three to five curriculum areas is the DACUM process.

3. The consensus of opinion from this meeting based on information from the first year grant indicates that the curriculum areas to be considered for development during Year Two are: a) technology: radio frequency technology, detector technology, cryogenics technology, magnet technology, and b) clerical support: documentation specialist. These areas should be prioritized at the next working session in October.

4. The staff will share project information and data from the SSC Technical Training Project to interface with the two Tech Prep projects in this area.

5. The staff will explore ways to address apprenticeship training in the project.

6. The project will conduct five working meetings during Year Two as outlined on August 29.

7. The issue of conducting a comparative study of the economic growth in the Batavia area and the impact of Argonne and Fermi Labs on educational programs and the impact of the SSC on educational programs in North Central Texas should be brought up again at a later meeting.

8. The project staff will explore ways to pilot test the database as a clearinghouse for manpower demand/supply, and educational training programs to be used by vocational program planners, career counselors, etc.

9. The project staff will continue to explore avenues to showcase the findings of the SSC Technical Training Project.

10. The project staff will disseminate the findings of the SSC Technical Training Project through the THECB community college network.

PAPERS, CONFERENCES, DISSEMINATION OF PROJECT FINDINGS

To date, the project has taken the following action for disseminating and showcasing its accomplishments on the project and the curriculum to be developed during Year Two.

1. Texas Junior College Placement Officers' Association. October 9-11, 1991, San Antonio. Paper accepted.
2. North Texas Community/Junior College Association. November 13-15, 1991, Dallas. Paper accepted.
3. International Industrial Symposium on the Super Collider. March 1992, New Orleans. Paper submitted.

4. Texas Association of Postsecondary Occupational Education Administrators. Spring 1992. Request to be on program submitted.
5. Texas Association of Continuing Education. Spring 1992. Request to be on program submitted.
6. Texas JTPA Council. Spring 1992. Request to be on program submitted.

PROJECTIONS FOR YEAR THREE

Upon the successful completion of Year Two, the project anticipates accomplishing the following objectives for Year Three:

Anticipated Year Three objectives (July 1, 1992 - June 30, 1993):

1. Pilot test, revise, and disseminate the 3-5 curricula identified and developed in Year Two.
2. Develop 3 additional programs (for a total of 6-8) from the original list prioritized by the advisory committee.
3. Develop equipment lists, student material, and teaching strategies for developed curriculum.
4. Disseminate via conferences and forums information about the curriculum model developed in this project to industry, educational institutions, and government agencies for their use and replication.
5. Implement clearinghouse of manpower needs, manpower supply, educational programs, and SSC curricula developed and/or identified by this project.
6. Disseminate thru conferences and workshops the model procedures manual which documents the process of addressing the community college's role when faced with a major economic impact.

SUMMARY OF YEAR ONE FINAL REPORT

In summary, these goals and objectives of Year One conclude the design phase of this project and represent the process objectives agreed to in the NC/DCCCD SSC Technical Training proposal. The continuation of the project is critical for Years Two and Three. The work to be accomplished during Year Two includes: the update of the manpower database using 1990 BLS Census data; the comparison of economic trends between Batavia, IL an North Texas; a manual to document the process by which the SSC project addressed the event of a major economic impact; the identification and development of three to five critical curricula areas; the continued networking; and the dissemination of findings through various sources.

It is imperative that community colleges be an integral part of the planning process for the SSC. To this end the NC/DCCCD SSC project, in cooperation with THECB, has assumed the leadership role for all community colleges and technical institutes in the state to be proactive to the anticipated training needs of the SSC and its impact area.

It is anticipated that the process and procedures being used in the Navarro College/Dallas County Community College District Superconducting Super Collider Technical Training Project will be documented and will serve as a model for other community colleges to replicate who are faced with a major economic impact in their area, i.e., the establishment of a large defense contract or the closing of a major industry.

The superconducting super collider is the single most important scientific research project in the world. A wide range of technically skilled positions will be required to support this project during the design, construction and operation phases. The numbers and diversity of technical job skills involved cannot efficiently be met in any existing labor market without a structured, well-designed job training model which is locally based within the construction site regional area and developed on the basis of specific industry needs and regional projections of growth.

Two significant achievements of this project ar prodcess oriented and are as important as any of the hard products. The first achievement is the result of the vision of the THECB staff who caused the project to be a cooperative effort between two educational institutions which are directly affected by the SSC: Navarro College and The Dallas County Community College District. Through ancillary organization from state, government, local and county agencies, such as INTERLINK, North Central Texas Council of Governments (NCTCOG), Ellis County SSC groups, and Small Business Development Centers (NC and DCCCD SBDCs), the business/industry community has been impressed with the cooperation occurring among education, government, and business and industry.

The second achievement of the project has been to enhance existing efforts rather than to duplicate or attempt to recreate a system such as the Labor Market Information System (LMIS). The project has also linked two regional Quality Work Force Planning Councils: INTERLINK and HOTLINK. This cooperation is unique to the project and could be replicated. In short, this project has increased the credibility of higher education with the business and industry community as well as with the federal and state agencies associated with this huge economic and scientific project.

APPENDIX A

Goals, Objectives, and Time Line for Year One

NAVARRO COLLEGE/DALLAS COMMUNITY COLLEGE DISTRICT
SSC TECHNICAL TRAINING PROJECT

GOALS, OBJECTIVES, AND TIME LINE FOR YEAR ONE
July 1, 1990 - June 30, 1991

This document will address each objective in the proposal for Year One and describe how each was achieved.

The following discussion details the time line for accomplishing the goals and objectives of Year One.

Goal 1: Initiating the Project. Seven objectives were achieved to accomplish Goal 1.

1. The Notice of Award was received on July 17, 1990.
2. The Executive Director position was advertised in August and filled on September 1, 1990.
3. The office space in Waxahachie was identified in January 1991. Prior to that date, the Executive Director had an office on the Navarro College Corsicana campus, and the DCCCD Coordinator had an office in the Bill J. Priest Institute for Economic Development. In summer 1991, the SSC Lab made available office space in the DeSoto headquarters for the use of the NC/DCCCD SSC project.
4. It was determined that the executive committee should include representatives from the two project institutions and become an internal governing group.
5. A project management meeting was conducted on October 10, 1990, to include the project staff, executive committee members, and fiscal staff from both institutions. A printed project organization chart was distributed and responsibilities were assigned. Also, the flow of communication and budget issues were discussed. A formal working agreement between Navarro College and Dallas County Community College District was drafted, negotiated, and signed.
6. The Executive Committee met individually with project staff in the initial phase and were kept abreast of and asked for input throughout the entire project.
7. One educational task force—made up of representatives from Tarrant County Junior College, Paul Quinn College, Hill College, Trinity Valley College, TSTI, and College of Du Page,—and one industrial advisory committee—made up of representatives from such industries as Texas Instruments, Johnson Johnson and Roy, Parsons Brinckerhoff/Morrison Knudson, and governmental agencies, such as DOE, TNRLC, SSC

NCTCOG, NTC, Ellis County Chambers of Commerce,—were established. A project advisory committee meeting was held on April 22, 1991. Prior to that, project staff initiated a meeting with THECB on February 8, 1991, discussed the progress of the project, and submitted an interim report.

Goal 2: Conduct a Study to Investigate Educational Needs, Labor Market Demand and Economic Impact, and Determine Data Elements Needed for the Planning Model. Eight objectives were achieved to accomplish Goal 2.

1. The project identified INTERLINK as a major resource for labor market information; initial contact was made in November 1990. Discussions of how INTERLINK could play a role in the SSC project progressed, and in march, 1991 a contract was signed with INTERLINK to: review bid specifications for the economic study, to provide a list of bidders, and to monitor the duplication of effort and activities once a subcontract was awarded.
2. Details of the Request For Proposal were developed by the project team, reviewed by INTERLINK, and bids were let to contract with a state registered economist to conduct an economic impact study and to develop a software database of the study results. This shows a strong link between the project and regional and state government agencies and industry so important to the success of this project. Through competitive bid, NCTCOG was selected in April.
3. In order to make the best use of available resources, the SSC project decided to use the LMIS database, to expand the update to years 1995-2000, and to modify the geographic region to involve two counties in the HOTLINK which are included in the nine-county SSC-impact area for this study. (Networking with HOTLINK indicates a linkage between regional planning councils which are relatively unique for a project such as this. It was necessary to include HOTLINK, its resources and data, because of Hill County's and McClennan County's role they will play in the SSC arena through Hill College and TSTC). Additionally, the SSC project was to conduct a comparative study between the five-county Batavia, IL national lab area and the nine-county North Central Texas SSC impact area (The five-county Batavia, IL area is where Argonne National Lab, Fermi Lab, and College of DuPage are located. A historical study of the growth patterns and economic impact of these labs on the surrounding county and community college could be useful in projecting the anticipated impact of the SSC on the North Central Texas area and the community colleges directly affected). Software and 1980 Bureau of Labor (BLS) Census data have been purchased to accomplish this task. This comparative study is being postponed until Year Two when 1990 BLS Census data will be available, to ensure the study will be conducted under the same parameters set forth for the SSC economic study.

4. The economic study has defined the specific occupations directly related to the SSC and related businesses and industries. They have been identified in a two-digit SIC code by NCTCOG for this project. Once these manpower demands of the SSC were entered into the LMIS, the ancillary jobs and their manpower requirements for the nine-county SSC-impact area were analyzed.
5. The database developed by NCTCOG includes the technical program inventory from the THECB. Data can be retrieved by identifying programs to indicate educational institutions which match the manpower requirements of the SSC-impact area. Year Two of the SSC project will identify and develop three to five technical programs. Consideration will be given to a variety of delivery methods and the development process will be documented for each.
6. One of the objectives for Year One of the SSC project was to identify hiring and staff development needs for instructors of SSC-related courses/programs. This will be done when the programs are identified and the curricula developed. This will be done in Year Two with help and close cooperation from other national scientific labs and the work that the University of Houston has done in developing an SSC technology resource with THECB Carl Perkins funds. This shows a strong linkage between the SSC project and universities which have an interest in SSC related research. It also shows cooperation with other Carl Perkins funded projects which adds strength to both projects and the efforts of the THECB.
7. Once the curricula areas are defined and the curricula have been developed, then the database developed by NCTCOG for this project will be able to match economic data, business and industry job skills, community college and technical institute training, and staff requirements.
8. The conclusion of the needs analysis phase of the project for Year One includes the final products developed by NCTCOG and included in this report. (It is imperative that this database be updated during Year Two to include 1990 BLS Census data).

Goal 3: Apply Needs Analysis Data in Designing Curricula, and Database System Specifications to Match Individual User Needs. Three objectives were achieved to accomplish Goal 3.

1. A curriculum design document was developed during Year One. This document details the process for exploring and developing new associate degree programs to train workers for high technology and emerging occupations. Also, a complete curriculum was developed for an Industrial Technology program to train the general entry level technicians for the SSC. (This curriculum was developed with institutional funds as part of the project matching requirement.) The development of a contract training pilot program was postponed to Year Two. This will involve the training for small and minority businesses through the Small Business Development Centers. (SBDCs will play an increasingly important role in addressing needs of the SSC, especially in procurement and matching industry with jobs and training requirements).

2. A flow diagram of data elements, employment needs, and a data dictionary of terms has been prepared by the NCTCOG as the subcontractor for the project and is included in their Executive Summary.

3. The data and specifications for the database were reviewed and validated by a board of economists on July 26. (It is a standard procedure to assemble selected, practicing economists who have general and specific knowledge of the area in order to tailor the economic estimates to the local region. The forecast model used only includes a general standard model and must be taken through this additional step. The board of economists that met included the following people:

Debbie Beck	TEC
Don Johnstone	TEC
Sam Webster	TI & INTERLINK
Jamie Villela	DCCCD
Charles Orsak	Navarro College
Heath Taylor	Navarro College
Art Ekholm	TU Electric
George Kelly	SW Bell
Jim Deegan	LPSC
Donna Parker	Fort Worth Chamber
CJ Westmoreland	H-GAC
Patti McGlohen	DCCCD
Robert Prejean	NCTCOG
John Bassler	Congruent Systems
Mark Hunt	Greater Dallas Chamber
Lyssa Jenkens	NCTCOG).

While the final products for Year One have included the needs assessment for curriculum development by developing the database, identifying the SSC-related and ancillary jobs, and producing the curriculum development document, there are additional benefits that are just as important in a project such as this, especially in the initial stages of work. Three of these additional benefits include:

1. THECB staff created a joint project which provided multiple resources from institutions to approach the task. On the other hand, it took time to organize, to amalgamate the objectives from two grants, to understand the different work processes for two different sized institutions, and to develop a cohesive working relationship between Navarro College and the Dallas County Community College District. Once established, it now provides a proven model of inter-institutional cooperation which will produce long-term benefits, both locally and state-wide.

2. Identifying resources and building bridges through networking with business/industry, governmental agencies, and educational institutions at the federal, state, county, local, and private sector levels has been a major accomplishment of this project and has been a time consuming task. However, this process is essential if the data and communication channels needed for current and future cooperative efforts are to

be created. As the SSC progresses from concept to design, and then progresses through the various phases of actual construction, only those who have established a working relationship with all the entities affected by the SSC will be in a position to be in the planning processes which will affect the educational activities related to the SSC.

3. The NC/DCCCD SSC Technical Training project has complemented the work of the THECB and the Quality Work Force Regional Planning Group. As a result the project is now being recognized as a viable contact for information distribution for student internships, job information, and manpower projections for the SSC. The project has recently received donated office space, telephone, and equipment in the SSC Lab. Additionally, the project has been approached by several organizations, such as the Texas Community College Association of Placement Officers, North Texas Community/Junior College Consortium, the National Council for Resource Development, the International and the Industrial Symposium for the Superconducting Super Collider, to make presentations on its findings. As a result, the project has tentatively scheduled five papers to be delivered at state and national meetings in Year Two. Two of these papers will be presented nationally in conjunction with the College of DuPage in Illinois, and will address the role of the community college in meeting training needs for a national scientific laboratory. Other opportunities to disseminate the findings will be explored.

APPENDIX B

An Approach to Developing a Curriculum

A Navarro College/Dallas County Community College District Approach To Developing A Curriculum

A NC/DCCCD Approach to Developing a Curriculum

Introduction

The Superconducting Super Collider (SSC) is one of the most important scientific endeavors since this country's initial steps into space in the 1950s. The people of North Central Texas, particularly those within the environs of Ellis County, will be affected immediately and directly. Though similar projects exist, nothing of this magnitude or potential impact exists anywhere in the world.

It is apparent that the SSC will require a trained work force in place when jobs were available. For this reason, Navarro College and Dallas County College District SSC Project created a plan to develop curriculum to meet the needs of the SSC for entry level technicians.

Vocational technical education in Texas is being converted to a system of competency-based education (CBE) due to a mandate from the Texas Higher Education Coordinating Board. This mandate evolved from the Carl D. Perkins Vocational Education Act of 1990. Therefore, the project used the competency-based approach defined as

> ". . . an approach in which we clearly state the expected outcomes, we organize and deliver instruction in a manner that maximizes learning for each individual student and we evaluate students on their ability to perform." (*Implementing Competency-Based Education: a Resource Guide*. Amarillo, TX: Texas State Technical Institute, n.d. p. 4).

Much of the curriculum developer's efforts were devoted to identifying "competencies" relative to the needs of the student training for an entry level technician position for the SSC. The same source defines a competency as a task:

> "a complete useful unit of work actually performed by workers on the job. A job task is observable, has a definite beginning and ending point and describes exactly the product or service that is being produced or performed."

The purpose of this document is to describe the process used to develop the Industrial Technology curriculum, and to provide a guide for other institutions wishing to emulate this process.

It is important to note that the process described below is an after-the-fact description of events that did not follow a carefully laid out, preliminary plan; rather, this process unfolded in an intuitive manner. Decisions were based on events occurring at a certain time, and these decisions were followed by others that seemed to proceed naturally from preceding decisions and tasks. Although the following description is an attempt to systematize the process employed by the project and must necessarily be described in a linear fashion, many of the tasks and events described occurred in an overlapping manner.

Preparatory Phase

Training Needs Assessment

The first step in the curriculum development phase is to determine whether the need exists for the type of training proposed. Various methods can be employed to obtain such information; generally these methods may be categorized in two ways. The first source of information, primary data, refers to that which is actually obtained by the searcher, such as observation, personal or telephone interviews, and surveys. The other source of data, known as secondary data, is that which has been researched by another. Library and organization publications and sources are examples of secondary data.

Choice of a method should depend upon the suitability of the method for achieving your purpose, the potential productivity of the chosen method, and cost factors (postage, travel and meals, duplication, etc.)

This particular curriculum development depended upon the personal interview method as the most effective and dependable method of obtaining data on training needs for the future technician in the Superconducting Super Collider. The advantages of this method are:

- Provides personal contacts with the target community
- Allows for immediate networking
- Allows for immediate feedback and correction of data
- Conversational flow provides a setting conducive to gathering judgments and attitudes as well as hard data

- Can provide information that supplements information gathered by other means
- The questioner is more likely to come away with desired information than by means such as mail surveys to which fewer people respond.

In addition to the obvious questions of cost involved, there are precautions one must be aware of with the personal interview method of obtaining information. One must be especially careful that questions are phrased with clarity, and that ambiguities are sorted through. Additionally, both the interviewer and the interviewee may be under the influence of external factors that may interfere with the flow of information. In these cases, of course, an extra measure of sensitivity is required. Finally, the success of the interview depends in part on the willingness of the subject to disclose.

Steps for conducting the personal interview:

1. ***Develop a visitation schedule.***

2. ***Assemble an interviewer's kit which may contain the following:***
   a. questionnaires
   b. letter of introduction
   c. tips for conducting the interview
   d. expense forms for recording time, mileage, meals, etc.
   e. pens, pencils, paper
   f. procedures for coding and recording data

3. ***Train interviewers regarding***
   a. all areas listed above
   b. use of questionnaires
   c. tips for interviewing

4. ***Make arrangements for the interview***

5. ***Conduct the interview***
   a. remind the interviewee about the nature of the survey
   b. motivate the respondent's interest
   c. obtain information
      i. talk as you write

ii. record all information

iii. keep respondent focused

6. *Thank interviewee when interview is concluded*

The telephone interview may be used in much the same way as the personal interview. However, the disadvantage of not being face to face with the subject should be apparent.

Employing the personal interview method chiefly and the telephone interview secondarily, the developer used the SSC Department of Human Resources as the initial source for personnel who could assist in the discussion of training needs for the future technician. From this source, other employees were identified, for example in vacuum technology and electrical engineering. These employees in turn identified others in departments relevant to the mission of the project. On average, after three meetings with certain SSC personnel, the developer was able to identify training needs and competencies in each of the relevant areas.

Identify Departmental Structure

From these interviews one can extrapolate the departmental structure of any given organization to identify of areas that may provide a map for the training needs. Such structures may lend themselves naturally to curricular divisions or areas. In this project, the identification of areas within the SSC such as cryogenics and vacuum technology supplied natural curricular divisions.

Sample Other Relevant Organizations

Another method of obtaining information is the sample. Using feedback from staff of the SSC as well as knowledge from personal experience, the developer identified a sampling of organizations that could be potentially useful in delineating training skills and competencies. These organizations, to be visited at a later date, included

- Other companies
- Schools

Data Collection and Resource Development Phase

Textual Research

Collect College Catalogs

A helpful preliminary step in the data collection process is to ascertain which schools have programs similar to or in some way relevant to the curriculum being designed. For this project, approximately seventy state and national college, university, and technical school catalogs were obtained for the purpose stated above.

Reduce Data

By employing a simple matrix, one can identify major curriculum areas in a column (for this project, *e.g.*, Engineering Technology, and Industrial Technology). Use the rows on the matrix to identify the colleges that teach these programs. This activity identifies the most commonly taught degree plans relevant to the curriculum being designed.

Extract Models

Using the catalogs, study the identified degree plans and their supporting course descriptions for the purpose of identifying features of these courses that could be employed in the curriculum under development. For this project, the designer sought specific elements pertaining to SSC technology, such as cryogenics and vacuum technology.

Examine Existing Curricula

Examining one's existing curricula to determine if modifications in structures already established can be made may be a more efficient method than attempted to build a new curriculum from scratch. Such actions have several advantages including reduction of necessity of writing new course descriptions, identifying new competencies, selecting new textbooks, etc. There must, of course, be a good fit between what is desired and what already exists. In Texas, one further advantage is that an existing course has already gained approved by the Texas Higher Education Coordinating Board, thus eliminating the need for the time consuming and elaborate procedure required to initiate new courses. For this project, many of the competencies required were already being taught in existing courses, but these competencies needed to be highlighted or emphasized for SSC needs. At Navarro it was possible, after the minor alterations were made in existing courses, to take a then inactive curriculum and rearrange and revitalize it, adding a new option. In this case, the Industrial Maintenance program was revised to include a new option in Industrial Technology.

Perform relevant library and database research.

Attend appropriate meetings

Convocations such as meetings or symposia can provide excellent opportunities for data collection and informal contacts. During the course of this project, the SSC moderated various meetings for educators; the developer took these opportunities for more informal contacts with individuals who later became members of his advisory committee.

Establish Advisory Committee

The advisory committee is the link between the school and the community. Representatives on this committee should have the requisite subject area knowledge to advise the school appropriately regarding the technical program; generally their function is to provide advice in determining general policies and types of occupational education needed in the community. The committee should be a formally organized entity whose members serve for a clearly defined term. Specifically, functions of the advisory committee may include:

- to serve as a communication channel between the school and the community
- to assist in identification of program needs
- to assist in identification of resources
- to represent the community in suggesting new or modified curricula
- to suggest related technical information that should be considered in the development of the technical program
- to recommend competent personnel from business and industry
- to assist in marketing programs
- to assist in identifying facilities for internships and on- the-job cooperative work experience
- to inform the school of changes in the labor market warranting a review of the curriculum
- to assist in recruiting students, providing facilities, and placing program graduates
- to assist in curriculum evaluation
- to assist in assessing impact of program on the community
- to provide advice on space needs

- to suggest and support needed local, state, and national action to assure adequate technical education programs
- to assist in identifying competencies, skills, knowledge, and attitudes needed to prepare students for entering the job market in the particular technical area
- to recommend standards of competency and achievement
- to review special project results
- to assist in long term program planning

SITE VISITS (Industry)

Metallurgy/Materials Testing

Coolidge Foundry & Fabrication
Coolidge, TX

Measurements/Metrology

Jetco Chemicals
Corsicana, TX

Profitt's Welding
Midlothian, TX

Oil City Iron Works
Corsicana, TX

Vacuum/Cryogenics

Tatum AC/REF.
Corsicana, TX

Quality Control

Superconducting Supercollider Lab
DeSoto, TX

Gerry Tool
DeSoto, TX

Fairfield Mnfg.
Lafayette, IN

Jetco Chemicals
Corsicana, TX

Hydraulics/Fluid Mechanics

Vitters Implement Co.
Corsicana, TX

AIRSCO
Dallas, TX

Magnets

Houston Advanced Research Center
The Woodlands, TX

SITE VISITS (Schools)

TSTI
Waco, TX

Navarro College
Corsicana, TX

Note: used existing competency materials from both institutions

University of Houston (Physics Dept.)
Houston, TX

Administrative guidelines for the advisory committee

- when adequate program identification information is gathered, advisory committees should be established by the appropriate college official or body
- determine makeup of membership; will students be included?
- assign a college staff member the responsibility for coordinating the activities and reports of the committee.
- develop an annual plan including meeting dates, tentative agendas, and yearly objectives and activities
- select both a chairperson to preside at meetings and a secretary to record minutes of the meetings
- Make contacts by phone and mail to arrange site visits

Site Visits and Interviews

Industry

Conduct site visits in order to ascertain how technicians operate on a day-to-day basis. Employing three-to-four hour interviews with technicians, one can answer such questions as:

- what do the technicians do?
- how do they do their jobs?
- what materials do they use?
- what processes do they support?
- what tools and equipment do they use?

Generally such interviews can uncover the technical and nontechnical knowledge, skills, and traits necessary for successful performance of the technicians' jobs. For this project, the interviewer was attempting to identify the competencies particular to technical jobs relevant to the SSC. Industries visited for this project included:

It is important to note that from these visits and interviews came a sense of some overall technology specific skills including:

- the ability to handle a variety of equipment ranging in technical sophistication from the ball-peen hammer to computer controlled mills
- the ability to troubleshoot
- the ability to engage in preventative maintenance

- the ability to perform quality control functions
- the ability to test for specifications
- the ability to perform manual labor which varies from simple heavy lifting to the skilled use of hand or power tools or other equipment

Additionally, the technician requires general job performance skills such as:

- the ability to contract with outside vendors and administer those contracts
- the ability to document work processes

Schools

Site visits to schools providing training in similar areas to that under development can be particularly helpful in determining how they use competency based education. Project members can compare competencies among instructors and identify those competencies common to more than one instructor. These repeated competencies bear special notice because they may be the more important competencies and may be employed in the project under development. Schools visited included:

- Richland College

Other special organizations.

By identifying and visiting specialized organizations the de developers may identify other competencies. For this project, the developer interviewed appropriate personnel at the SSC. From these conversations were developed broad competencies felt to be important to the entry level technician for the SSC. In this case the core competencies identified were not subject specific, but rather more general competencies applicable to technicians in any industry. These core competencies, covering both personal and professional characteristics, were:

- technicians must be able to use mathematical reasoning
- technicians must be able to use Standard written and oral English effectively
- technicians must be able to get along with others in the work setting
- technicians must demonstrate some basic understanding of scientific and technical literacy, of the sort covered by a general Physical Science course

- technicians must understand how to engage in technical work habits requiring clear and concise thinking, such as, working in an orderly manner, documenting work as necessary, and recognizing results of work by careful, objective observations of that work
- technicians must be able to use creativity to solve problems
- technicians must be able to work independently once assigned a task
- technicians must have a healthy and well-developed sense of what might be called the old-fashioned work ethic
- technicians must be skilled in practical, hands-on aspects of fields as diverse as hydraulics and metallurgy

Curriculum Development Phase

Assemble competencies from various sources

Incorporate these competencies into core courses and specialized courses, using existing course structures where possible (for example, see Attachment "A" for Industrial Technology Curriculum).

Clearly define courses, writing new descriptions when necessary

(see Attachment "B")

For this project, the competencies identified were:

- common competencies required of workers in general, competencies which would inform the entire curriculum under development (Attachment "C")
- broad competencies relating to the Industrial Technological portion of the curriculum (Attachment "D")
- competencies specific to each course (Attachment "E")

Implementation

Follow-through on local, state, and national procedures necessary to gain approval of program.

In implementing a new course or program, it will be necessary to schedule (students, staff and facilities), recruit students and faculty, obtain equipment, plan a budget, etc., before the doors open for classes to begin. To accomplish

this effectively, one should develop a management plan that identifies the activities to be completed, the persons who will take part in these activities, and the target dates for completion of the activities. By doing so, when classes begin, the staff will be prepared for the semester or year.

In the development of any new course or program, a concerted effort must be made on the part of the institution to recruit students. The recruitment, selection, and enrollment procedures developed must be consistent with present college policies and practices.

In implementing any new course or program, provision should be made to allow students to complete some type of oral, written, or other manner of performance measure to see if they can achieve proficiency in the course(s). Prepare a plan for allowing credit by examination if this procedure is in compliance with college policy and practices.

Prepare materials for distribution to potential students. In the development of any new course or program it is essential that the potential clientele be made aware of the course or program, and that enough interest be mustered so that students will enroll. Plans prepared for recruiting, selecting, and enrolling students must be consistent with school policies.

When developing a plan, the following decisions must be made:

- who will recruit
- when will they recruit
- how will they recruit
- what media will be used
- what materials will be distributed to news media, potential students, school counselors, and staff

(***Note***: These materials might include brochures, news releases, newspaper advertisements, special feature stories, and so on. You may choose to involve your advisory committee in both the planning and the execution of your student recruitment activities.)

Prepare audiovisual materials to be used in recruitment.

Develop a file of names and addresses of people and firms that will receive your recruitment information. Include:

- potential students
- school counselors

- school occupational teachers
- school career directors
- news media directors
- influential industry personnel
- potential employers
- union representatives if applicable
- community action agencies
- vocational centers
- employment commissions

Prepare a plan for staff recruitment visits with potential students. The development of a plan whereby career faculty of your school systematically visit high schools and organizations to explain your career programs is an essential feature by which you ensure the success of these programs. In addition, visitations allow you to meet with secondary guidance counselors, administrators, teachers, and students. These contacts help to keep them informed of your new courses and programs, existing courses and programs, and the relationship of these courses and programs to the employment market.

Prepare a staff plan for requesting ancillary student services. With the implementation of any new course or program ancillary services are needed to support it. The services needed will vary with the kind of course or program being offered and the students being served. Such services should be officially requested. The following procedures may serve as a guide for requesting student services:

- based upon the data gathered and the kind of students en rolling, determine the types of services needed. These may include counseling, developmental studies, financial aid, housing, coop or other employment, and library services.
- determine the personnel needed for support
- evaluate the adequacy of present services
- submit necessary recommendations, memoranda for personnel, justifications, or book or media request forms

For this program, the following steps were taken:

- Submitted proposed curriculum to College Academic Council (Attachment "F")

- Submitted Application for Program Revision to the Texas Higher Education Coordinating Board (Attachment "G")
- Submitted Title and Credential Change/Reason for Revision form to ***THECB*** (Attachment "H")
- Submitted Course Additions form (Attachment "I")
- Submitted Course Revisions form, in this case for one course (Attachment "J")

Estimating Financial Requirements

Financial requirements must be considered also. Program suggestions that are made to establish new offerings or modify existing offerings should be subjected to careful estimation of the personnel, facilities, equipment, and supplies required to implement the program. Sources that can supply such information include:

- facility guides published by trade associations, profession al associations, state and federal agencies such as the TAMU Center for Vocational-Technical Education.
- knowledgeable persons (directors, business managers, department heads) from schools that have similar programs
- knowledgeable consultants from the Texas Education Agency and other professional consultants
- cost studies of similar programs from within your own institution
- Design a format for recording estimated costs and anticipated new income (Attachment "K")
- Record the best cost estimates for operation of the program over a three-year period.

Conclusions and Recommendations

Within the state of Texas, there is a need for associate degree programs devoted to training technicians to support Superconducting Super Collider activities. Because many of the technician job descriptions for the SSC require the AAS, some schools in Texas should implement such curricula. Although the implementation of such a curriculum should initially be encouraged in the North Texas area, the area of the SSC itself, eventually other schools in Texas may wish to examine this curriculum, because it is broad enough to furnish technicians for many industries.

The curriculum development process described herein differs in its initial aspects from the process described in the ***DACUM*** handbook. ***DACUM*** (for "***D***eveloping ***A Cu***rriculu***m***") is a process employed to identify tasks necessary to a given occupation. To arrive at a profile chart detailing the duties and tasks involved in a particular job, eight to twelve experienced workers in the particular field to be analyzed are asked to form a committee. Working under the guidance of a facilitator, the committee works for one to three days to refine the job description, and identify duties and tasks for the ***DACUM*** chart (Norton, Robert E., *DACUM Handbook*. The National Center for Research in Vocational Education, The Ohio State University. Columbus, OH: 1985. p.1)

The reason this process was not employed was simply that the developer for this curriculum was not aware of it until well into the process which will be described above.

Another potentially helpful source discovered too late in the process to be of use was ***TEXCOM***, or Texas System for Developing a Competency-Based Curriculum, an adaptation of ***DACUM***.

Recommendation:

Personnel working on a curriculum development project should maintain a diary, log, or notebook of daily events, tasks, and decisions. Ultimately, one can assimilate such notes, to be reprocessed for various reports.

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APPENDIX C

Industrial Technology Curriculum

ATTACHMENT A

NAVARRO COLLEGE
INDUSTRIAL TECHNOLOGY CURRICULUM

First Year

First Term:

Course Prefix	Course Number	Course Title	Lec. Hrs.	Lab. Hrs.	Cont. Hrs.	Cred. Hrs.
I E	1013	Engineering Drawing I	3	3	96	3
Engl	1013	Composition & Rhetoric I	3	1	64	3
I E	1144	General Metals	3	3	96	4
Psy	1011	Education & Career Planning	1		16	1
C S	1034	Current Micro Software	3	3	96	4
Math	1213	College Algebra	3		48	3
		Total Hours	**16**	**10**		**18**

Second Term:

D D	1013	Computer Aided Drafting (CAD)	3	3	96	3
Engl	1033	Technical Report Writing	3		48	3
Ph Sc	1024	Physical Science I	3	3	96	4
Psy	1213	General Psychology	3		48	3
Math	1223	Plane Trigonometry	3		48	3
		Total Hours	**15**	**6**		**16**

Second Year

First Term:

Course Prefix	Course Number	Course Title	Lec. Hrs.	Lab. Hrs.	Cont. Hrs.	Cred. Hrs.
I T	2014	Measurement/Metrology	3	3	96	4
I T	2023	Intro. to Quality Control	3		48	3
I T	2033	Basic Circuits	3		48	3
Spch	1133	Business/Professional Speaking	3		48	3
Phys	1114	College Physics I	3	3	96	4
		Total Hours	**15**	**6**		**17**

Second Term:

I T	2114	Metallurgy/Materials Testing	3	3	96	4
I T	2124	Basic Hydraulics/Fluid Mechan.	3	3	96	4
I T	2044	Industrial AC/Refrig. Prin.	3	3	96	4
Elective			3		48	3
		Total Hours	**12**	**9**		**15**
		GRAND TOTAL	**58**	**31**		**66**

ATTACHMENT B

INDUSTRIAL TECHNOLOGY

Course Descriptions

I E 1013 ENGINEERING DRAWING I **3 lec/3 lab (3 Cr.)**
Study of proper use and care of instruments and tools, technique of mechanical drawing, orthographic projection, auxiliary projection, sections and pictorial drawings. Good lettering is stressed and practiced in print reproductions.

I E 1144 GENERAL METAL **3 lec/3 lab (4 Cr.)**
Introductory course in metalwork, including work with basic tools used in hot and cold metalworking to include silver-soldering and TIG welding techniques integrated into metal fabrication.

I T 2014 MEASUREMENTS/METROLOGY **3 lec/3 lab (4 Cr.)**
This course provides an opportunity to obtain a practical and theoretical understanding of many types of mechanical and optical measuring devices which are used in dimensional inspection. **Prerequisite: Math 1223.**

I T 2023 INTRODUCTION TO QUALITY CONTROL **3 lec. (3 Cr.)**
This course introduces some of the concepts and techniques currently being used by industry to prevent defective products from reaching the consumer. Included are reliability analysis, control charts, inspection and sampling plans. The language, terminology and organization of typical industry quality control functions are studied. Elementary probability and statistics concepts are presented as background.
Prerequisite: Math 1213

I T 2033 BASIC CIRCUITS **3 lec (3 Cr.)**
A basic introduction to DC and AC analog and digital circuits for non-electronic majors. Topics include safety, Ohm's Law, series-parallel circuits, voltage and current measure-ments, resistors, inductors and solid-state devices. This lecture-only course will also include demonstrations.

I T 2044 INDUSTRIAL REFRIGERATION PRINCIPLES3 lec/3 lab (4 Cr.)
The physical principles applying to refrigeration systems including thermodynamics, gas laws and heat transfer are covered and includes basic properties of refrigerants and the construction of pressure-enthalpy diagrams. The operations of vapor compression systems are studied. The proper use of hand tools and safety procedures followed in the industry are used.
Corequisites: IT 2033 and Ph Sc 1024.

I T 2114 METALLURGY/MATERIALS TESTING **3 lec/3 lab (4 Cr.)**
Basic metallurgy for non-metallurgists followed by instruction in various mechanical and testing techniques used by industry for testing materials and welding processes including nondestructive testing. Introduces tests and evaluations used on raw materials and fabricated parts. Topics include tensile and hardness testing, metallurgical cross-sectioning, temperature-humidity cycling and corrosion resistance testing. **Corequisites: Math 1213 and Math 1223.**

I T 2124 BASIC HYDRAULICS/FLUID MECHANICS **3 lec/3 lab (4 Cr.)**
Principles of hydraulics and fluid mechanics are examined. Hydraulic pumps, motors, cylinders and valves are studied. Emphasis is on the application of formulas related to the properties of fluids and the laws which govern fluid flow. Various hydraulic components are tested, and basic hydraulic circuits are set up and evaluated. **Prerequisite: Phys 1114.**

ENGL 1013 COMPOSITION AND RHETORIC I **3 lec/1 lab (3 Cr.)**
Includes study of grammatical and rhetorical principles as applied in written composition; study of nature and function of language; and study of rhetorical modes as description, narration, process, comparison, contrast, definition, classification, persuasion and critical review. **Prerequisite: passing score on basic skills test in writing.**

PSY 1011 EDUCATIONAL AND CAREER PLANNING **1 lec (1 Cr.)**
Required of all students as entering freshmen. Designed to prepare students for success in college. Topics include improving study skills, budgeting time, educational choices. Opportunities to appraise abilities, interests, personality traits and develop plan for career development.

C S 1034 CURRENT MICRO SOFTWARE **3 lec/3 lab (4 Cr.)**
An introductory course to state-of-the-art micro software. Topics will include such systems as spreadsheets, micro data bases, word processing, etc.

MATH 1213 COLLEGE ALGEBRA **3 lec (3 Cr.)**
Designed to satisfy degree requirements for most non-science majors. Topics include basic algebraic operations, exponents, polynomials, solving and graphing linear and quadratic equations, inequalities, stated problems, matrix operations, determinants, systems of equations and sequences and series. **Prerequisite: satisfactory score on algebra section of basic skills test or Math 1113.**

Ph Sc 1024 PHYSICAL SCIENCE I **3 lec/3 lab (4 Cr.)**
This course, designed for non-science majors, is a survey of topics in physics and chemistry including their relationship to the environment.

PSY 1213 GENERAL PSYCHOLOGY **3 lec (3 Cr.)**
A survey of the major topics in psychology. Introduces the study of behavior and the factors that determine and affect behavior.

MATH 1223 PLANE TRIGONOMETRY **3 lec (3 Cr.)**
Topics include definition and use of trigonometric functions, solving right triangles, the use of degree and radian measure, angular velocity, acceleration, fundamental identities, graphing trigonometric functions, logarithms and graphing conic sections. Solving trigonometric equations, stated problems, complex numbers, vectors and polar coordinates. **Prerequisite: Math 1213 or satisfactory score on algebra section of basic skills test.**

SPCH 1133 BUSINESS AND PROFESSIONAL SPEAKING **3 lec (3 Cr.)**
Designed for students entering business and the professions. Emkphasis is on principals, leadership strategies, listening skills and non-verbal skills necessary for such types of communication as interviewing, group decision making, corporate advocacy, presenta-tions and conducting meetings.

PHYS 1114 COLLEGE PHYSICS I **3 lec/3 lab (4 Cr.)**
An algebra/trigonometry-level approach toward physics for students preparing for medical, dental or other science-related fields. Topics include the study of basic mechanics, Newton's laws of motion and gravity, conservation laws of energy and momentum, rotational motion, thermal properties of matter, heat transfer, wave motion and acoustical phenomena. **Prerequisite: Math 1223.**

ENGL 1033 TECHNICAL REPORT WRITING **3 lec (3 Cr.)**
Study of fundamentals of technical writing. Included are studies in purpose of reports, writing, checking and revising reports, gathering and evaluation materials; industrial use of reports and forms; oral reports and conferences and letter writing. **Prerequisite: Engl 1013.**

DD 1013 COMPUTER AIDED DESIGN (CAD) **3 lec/3 lab (3 Cr.)**
A course designed to introduce the student to Computer Aided Drafting (CAD) as another means of preparing detailed drawings. Emphasis is placed on equipment familiarization, graphics/terminal functions and the application of computer graphics to the development of drawings to industry standards. **Corequisite: IE 1013 or approval of the instructor.**

ATTACHMENT C

Common Elements for Industrial Technology Education

The following elements are common to all courses in industrial technology, unless otherwise noted, and shall be included in each course at the appropriate level. They are described here to preclude repetitions in each course.

1. ***Concepts and skills related to successful employment. The student shall be provided opportunities to:***
   a. demonstrate effective communications skills, both oral and written and follow through on assigned tasks.
   b. demonstrate dependability and punctuality.
   c. demonstrate productive work habits and attitudes.
   d. understand the importance of taking pride in the quality of work performed.
   e. recognize the dignity of work gained by productive employment.
   f. develop skills in planning and organizing work.
   g. apply required methods and sequences when performing tasks.
   h. apply principles of time management and work simplification when performing assigned tasks.
   i. identify ethical practices and responsibilities.
   j. understand the importance of the application of organizational policies and procedures.

2. ***Concepts and skills related to safety and safe working conditions. The student shall be provided opportunities to identify and apply safe working practices to all training situations.***

3. ***Concepts and skills associated with human relations and personality development. The student shall be provided opportunities to:***
   a. understand the importance of maintaining good health and a proper appearance for effective job performance.
   b. understand oneself and others.
   c. exercise self-control.
   d. accept and use criticism.
   e. recognize basic human relationships as they relate to business success.
   f. demonstrate characteristics for successful working relationships.

4. ***Concepts and skills associated with the specific occupation being taught. The student shall be provided opportunities to:***

   a. understand the basic concepts of and develop proficiency in the occupational area for which instruction/training is provided.

   b. develop a fundamental understanding of mathematical principles and scientific procedures.

   c. understand terminology utilized.

   d. identify tools, equipment and materials used.

   e. develop and demonstrate appropriate techniques for the selection, use, maintenance and storage of tools and equipment.

ATTACHMENT D

INDUSTRIAL TECHNOLOGY PROGRAM COMPETENCIES

Competencies expected to be mastered for entry-level Industrial Technology positions.

Communications

After successfully completing this curriculum, the student will be able to:

1. Demonstrate communications, skills including technical recording and reporting with specific emphasis in the area of documentation.

2. Demonstrate skills in communication that are appropriate in a fast-paced, technically oriented occupation.

3. Demonstrate the ability to correspond verbally and in writing with scientists and engineers.

4. Demonstrate leadership skills and human relations skills in order to work harmoniously with a varied group of people.

Mathematical Problem Solving

After successfully completing this curriculum, the student will be able to:

1. Demonstrate proficiency in analysis methodology.

2. Demonstrate proficiency in the application of algebraic principles to practical problem solving.

3. Demonstrate proficiency in the application of trigonometric principles to practical problem solving.

Scientific Problem Solving

After successfully completing this curriculum, the student will be able to:

1. Apply fundamentals of physics as they relate to the area of particle accelerators.

2. Recognize terminology used in the area of electrical systems, cryogenics and vacuum technology.

3. Relate the terminology of physics and physical science to actual job-site events.

Drafting/Computer Applications

After successfully completing this curriculum, the student will be able to:

1. Interpret working drawings, make necessary modifications and lay out working drawings.

Drafting/Computer Applications (Cont'd)

2. Perform operations needed to complete computer aided designs.

3. Demonstrate competency in various computer software operating systems and apply these competencies to job-site events and to use this information in solving problem applications.

Industrial Technology Specific

After successfully completing this curriculum, the student will be able to:

1. Exhibit safe utilization of various hand/power tools in their proper applications.

2. Demonstrate proper methods of silver-soldering and TIG welding.

3. Demonstrate the ability to read a blueprint/schematic.

4. Integrate statements 1, 2, and 3 as techniques in metal fabrication.

5. Practice quality control principles as they pertain to reliability analysis, control charts and basic statistical methods.

6. Demonstrate the ability to perform mechanical and chemical testing techniques as they apply to various ferrous and non-ferrous metals and to welding/soldering processes.

7. Exhibit skills in the areas of measurement and metering and to be able to use various types of mechanical and optical measuring instruments.

8. Demonstrate skill in the calibration of measuring instruments.

9. Display a knowledge of laser optics.

10. Apply the principles of hydraulics and fluid mechanics to a job-site event.

11. Employ testing devices to check fluid and hydraulic pumps, motors, cylinders, etc.

12. Demonstrate proficiency in AC/DC circuits.

13. Demonstrate proficiency in analog/digital circuits.

14. Demonstrate and practice the use of optical elements.

15. Apply the principles of refrigeration.

16. Employ leak detection devices in refrigeration systems.

17. Practice safety in all of the above procedures and operations.

ATTACHMENT E

Competencies for Measurement/Metrology IT 2014

Directions: Evaluate the student using the rating scale below. Mark the appropriate number to indicate the degree of competency. The rating for each of the competencies should reflect job readiness rather than the grade in the class.

Rating Scale:
4 - Skilled - can work independently with no supervision.
3 - Moderately skilled - can perform job completely with limited supervision.
2 - Limited skilled - requires instruction and close supervision.
1 - No exposure - no experience or knowledge in this area.

1. ***Understand the language of measurement***
   a. Define a line of measurement
   b. Define the terms precision, accuracy and reliability, tolerance sensitivity, and repeatability

2. ***Understand measurement/metrology***
   a. Demonstrate usage of the decimal-inch system, expotential notation, and basic geometry
   b. Convert fractions to decimals
   c. Display the ability to use metric measurements
   d. Convert decimal-inch/fractions to metric measurements

3. ***Understand measurement with graduated scales***
   a. Be able to use graduated scales within the recognized limitations and proper care
   b. Recognize the principle sources of error for measurement with graduated scales
   c. Describe the two types of graduated rules and explain how to select the correct one.

4. ***Understand the role of basic measurement instruments***
   a. Demonstrate the relationship between scale divisions and discrimination

b. Transfer measurements with dividers and demonstrate proficiency in the use of all scaled instruments

5. *Understand the role of vernier instruments*

a. Read vernier instruments

b. Identify the positional problems inherent in measurement

c. Explain how vernier scales increase resolution

6. *Understand the role of micrometer instruments*

a. Demonstrate increased amplification resulting in better readability and demonstrate the use of various micrometers

b. Describe how Abbe's Law contributes to micrometer measurement

c. Show how a screw adapts to the measurement of linear displacements

d. Demonstrate the importance of cleanliness and alignment as amplification increases

e. Demonstrate knowledge of the difference between ratcheting and non-ratcheting micrometers

7. *7. Understand the evolution of standards*

a. Show the relationship between light waves and standards

b. Describe the mathematical basis for gage block series

c. Demonstrate the use and calibration of gage blocks

d. Demonstrate how to wring blocks together effectively

e. Combine blocks for any desired dimension

f. Explain the environmental considerations that must be addressed when using gage blocks, i.e., temperature coefficients

8. *8. Understand measurement by comparison*

a. Explain the role of amplification in measurement

b. Demonstrate the difference between direct measurement and comparison measurement

c. Show practical applications for low-amplification comparator instruments

d. Compare analog (dial) and digital instruments

e. Explain what errors are associated with analog (dial) instruments

9. *Understand high-amplification comparators*

a. Show the distinction between measuring instruments and gages

b. Show how power amplification makes a radical departure from mechanical instruments

c. Demonstrate the practical advantages of multiple scale selection

d. Explain the basis of the ten-to-one rule

10. *Understand pneumatic measurement*

a. Demonstrate how amplification may be increased without as great a reduction in range as is required for mechanical and electronic instruments

b. Demonstrate the advantages gained by eliminating metal-to-metal contact

c. Show the value of measuring several features simultaneously

11. *Understand the role of calibration and its importance in measuring instruments*

a. Explain the effect of errors

b. Demonstrate general calibration techniques

c. State the limitation of the ten-to-one rule

d. Demonstrate minimizing observational errors with High-Amplification comparators

e. Demonstrate knowledge of the 4:1 ratio of calibration traceability

12. *Understand the importance of light waves as length standards*

a. Describe the difference between the physical nature of light and the geometrical concept of light rays

b. Explain the phenomenon of interference and the formation of fringe bands

c. Describe how fringe bands are manipulated for linear measurement

d. Describe the only method of achieving high amplification without external power

e. Explain the importance of using a monochromatic light to produce interference fringes

13. *Understand the historical importance of flatness and reference planes*

a. Explain the degradation of the workmanship principle

b. Describe modern reference surfaces

c. Evaluate flatness

d. Demonstrate knowledge of convex and concave errors

14. *Understand the importance of the circle in metrology*

a. Demonstrate with drafting instruments the relationship of the circle to angle measurement

b. Demonstrate the role of squares

c. Demonstrate the role of levels

d. Perform precision angle measurement

e. Apply trigonometric functions

f. Demonstrate the difference between linear and angular measurement

g. Demonstrate the role of sine bars and plates, angle blocks, surface plates, and clinometers

h. Demonstrate knowledge of how to build angles with sine bars

15. *Understand the significance of surface metrology*

a. Explain the essential differences between surface metrology and other dimensional metrology

b. Assess surface textures

c. Apply standards to surface texture

16. *Understand coordinate measuring machines*

a. Explain why CMMs have potentiality not shared by individual measuring instruments

b. Explain the significance of the computer when coupled to a CMM

c. State the relationship between CMMs, computer numerically controlled (CNC) machining centers and computer assisted drafting (CAD)

17. *Understand optical metrology*

a. Distinguish between light waves and rays

b. Explain the significance of geometric optics

c. Explain the phenomenon of image formation

d. Explain the difference between mechanical and optical magnification

e. Define optical tooling and explain about the two different techniques

18. *Understand the uses and functions of a microscope*

a. Explain how the principle of the magnifier is extended to higher powers

b. Compare advantages and limitations of the microscope as compared to other high powered instruments

c. Explain the significance of the image in multiple element microscopes

d. Show how the reticle makes a microscope a measurement instrument

e. Detail the chief roles of the microscope in applied metrology

f. Demonstrate the use of the microscope in applied metrology

19. *Understand the functions of optical comparators*

a. Explain the difference between optical comparators and microscopes for measurement

b. Describe the optical systems required for comparators

c. State the significance of interchange and displacement measurement

d. Describe the application of comparators for linear, angular and contour measurements

20. *Understand optical alignment*

a. Explain the significance of the reversal techniques

b. State the role of those instruments that rest on the work being examined

c. State the role of those instruments that rest on stands independent of the work being examined

21. *21. Understand the distinctions between measurement, gaging and tolerances*

a. Define tolerance

b. Define maximum material condition

c. Demonstrate bilateral tolerancing using the customary arithmetic method

22. *22. Understand the relationship between statistics and metrology*

a. State the relationship between measurement and statistics

b. Explain why statistical control is based on measurements that have already been taken

c. Describe how statistics allow production to be controlled for better products at lower costs

d. Demonstrate the use of X bar and R charts, showing the relationships of control limits and specifications limits

e. Demonstrate the use of standard deviations, mean, mode and median, in practical problems

23. *23. Understand the role of the National Institute of Standards and Technology (NIST)*

a. Explain the relationship between National Standards and Secondary Standards

b. Demonstrate knowledge of the proper procedures for providing traceability to National Standards

c. Understand the importance of Exchange Standards

Competencies for Introduction to Quality Control IT 2023

Directions: Evaluate the student using the rating scale below. Mark the appropriate number to indicate the degree of competency. The rating for each of the competencies should reflect job readiness rather than the grade in the class.

Rating Scale:
4 - Skilled - can work independently with no supervision.
3 - Moderately skilled - can perform job completely with limited supervision.
2 - Limited skilled - requires instruction and close supervision.
1 - No exposure - no experience or knowledge in this area.

1. ***Understand the need for quality control***
   a. Emphasize customer satisfaction
   b. Reduce scrap and rework rates
   c. Improve product quality
   d. Give examples of quality products

2. ***Understand the design of quality control systems***
   a. Define quality in a multi-dimensional concept
   b. Demonstrate that quality must begin with the design
   c. Show the importance of incoming raw materials inspection
   d. Identify each process that must be controlled
   e. Identify critical control points
   f. Identify precise points at which the product should be inspected
   g. Design a flow-chart for a particular product

3. ***Have knowledge of measurement systems used in quality control***
   a. Define measuring systems used in specific quality control systems
   b. Demonstrate the use of measuring devices to determine variables in a specific product
   c. Define an attribute and give examples

4. *Understand the advantages of statistical quality control*

a. Define acceptance sampling and demonstrate the ability to apply this to a specific product

b. Define process control and state specific instances where this is needed

c. Use measurements or attributes or variables to determine if a product is acceptable

5. *Understand acceptance sampling*

a. Define acceptance sampling

b. Show the importance of random selection

c. Calculate sample sizes needed from various sized populations

d. Define probability of accepting incoming materials

e. Solve a problem using the operating characteristic curve

f. Define acceptable quality level as it relates to the use of the operating characteristic curve for incoming materials

g. Define acceptable quality level

h. Define Type I and Type II errors and demonstrate their use in a practical situation

i. Define lot tolerance percent defective

j. Read a nomograph of cumulative binomial distribution

k. Calculate the results of a problem using the nomograph

l. Show how to read an operating characteristic curve

6. *Understand process quality control*

a. Define variability as it relates to process control

b. Show that production processes are not usually found in a state of control

c. Read a process control chart

d. Demonstrate the ability to work a problem using the process control chart

e. Show how the process control chart can be used for measurements of variables

7. *Understand the use of basic statistics*

a. Define mean, median and mode

b. Demonstrate the ability to work problems involving mean, median and mode

c. Define standard deviation

d. Demonstrate the ability to calculate standard deviation

e. Define a Pareto diagram and demonstrate the ability to read one

f. Define and read an Ichikawa fishbone chart

g. Apply the fishbone chart to a cause-effect problem

8. *Understand X-bar and R Charts*

a. Define the process in its relationship to other operations/users both upstream and downstream and in terms of the process elements (people, equipment, materials, methods and environment) that affect it at each stage

b. Determine characteristics to be managed

c. Define current and potential problem areas

d. Correlate between characteristics

e. Define the measurement system

f. Minimize unnecessary variation

g. Gather data

h. Select size, frequency and number of subgroups

i. Set up control charts and record raw data from hypothetical situations

j. Calculate the average and range of each subgroup

k. Select scales for the control chart

l. Plot the averages and ranges on the control charts

m. Calculate control limits

n. Draw lines for the averages and the control limits on the charts

o. Interpret for process control

p. Determine outliers or special causes and correct or justify them

q. Recalculate control limits, if needed

r. Extend control limits for ongoing control

Competencies for Basic Circuits IT 2033

Directions: Evaluate the student using the rating scale below. Mark the appropriate number to indicate the degree of competency. The rating for each of the competencies should reflect job readiness rather than the grade in the class.

Rating Scale:
4 - Skilled - can work independently with no supervision
3 - Moderately skilled - can perform job completely with limited supervision
2 - Limited skilled - requires instruction and close supervision
1 - No exposure - no experience or knowledge in this area

1. ***Understand direct current electronics***
   a. Explain electron flow in a conductor
   b. Compare electron flow in insulating materials

2. ***Understand Ohm's Law and power theory***
   a. Explain the interrelationship of voltage, current and resistance
   b. Apply Ohm's Law
   c. Calculate unknown value, when given two circuit parameters
   d. Relate Ohm's Law to circuit measurements

3. ***Build direct current circuits using breadboard and printed circuits***
   a. Demonstrate skill in soldering techniques
   b. Demonstrate desoldering techniques
   c. Construct terminal and printed circuit connections
   d. Demonstrate knowledge in construction of circuits on socket boards, perforated boards, wire wrap and printed circuit boards

4. ***Understand magnetism as it relates to inductance***
   a. Demonstrate knowledge of magnetism and its application in electronics
   b. Explain electromagnetic induction and its application
   c. Demonstrate knowledge of electromagnetic devices and their applications

5. ***Understand alternating currents as related to measurements, wave forms, capacitive and inductive circuits, transformer and tuned circuits as used in electronics***

   a. Demonstrate knowledge of the use of mathematics in the solution of AC circuit problems and vector analysis

   b. Explain the principles, functions and methods of measuring alternating current

   c. Apply the electron theory to volts, current and resistance and alternating current electrical components and circuits

6. ***Understand generators and alternators***

   a. Explain the operating principles of generators

   b. Explain how magnetism is used in generating electricity

   c. Explain the principles of alternator operation

   d. Compare similarities between generators and alternators

7. ***Determine effects of resistors, capacitors and inductors on alternating current***

   a. Demonstrate knowledge and skill of utilizing resistors, capacitors and inductors in alternating current circuits

8. ***Understand and apply the characteristics of series parallel resonant circuits and filter systems***

   a. Demonstrate knowledge and skill to connect band-pass circuit to alleviate unwanted current flow and maintain signal current

9. ***Understand semiconductors' structure and theory of operation***

   a. Explain the atomic theory

   b. Demonstrate knowledge of basic semiconductor theory

   c. Explain the construction and application of semiconductors

10. ***Demonstrate the operation of transistors by observing and measuring electrical characteristics***

   a. Confirm transistor operation by measuring signal at base, emitter and collector

   b. Discriminate between PNP and NPN transistors by comparing voltage/current readings

11. *Investigate basic theory of frequency modulation (FM) and amplitude modulation (AM)*

a. Demonstrate basic knowledge of frequency modulation and amplitude modulation

b. Explain the effect of mixing frequencies

c. Demonstrate an understanding of the organization of receivers and transmitters

12. *Have knowledge of television systems and subsystems*

a. Explain how the circuits in a television set sum together to provide communication

b. Explain the construction and operation of the picture tube

c. Demonstrate knowledge of the operation of the television camera

d. Explain circuit operation in tuner and yoke

13. *Have knowledge of digital electronic circuits*

a. Demonstrate knowledge of basic components of registers and gating/summing circuits

b. Demonstrate knowledge of circuitry used for addition and subtraction

c. Demonstrate an understanding of transmission data

d. Demonstrate knowledge and skill in converting analog to digital

e. Demonstrate knowledge and skill in converting digital to analog

14. *Have knowledge of microprocessor theory and logic*

a. Explain how a memory system is organized and addressed

b. Explain how data is moved in and out of a memory system

c. Demonstrate understanding of how a microprocessor is organized

d. Explain how the microprocessor addresses and moves data

15. *Understand the absolutely essential need for safety*

a. Demonstrate safe practices in all situations

16. *Understand three-phase wiring*

a. Explain color coding on wiring and recognize its importance

Competencies for Industrial Air Conditioning/Refrigeration Principles IT 2044

Directions: Evaluate the student using the rating scale below. Mark the appropriate number to indicate the degree of competency. The rating for each of the competencies should reflect job readiness rather than the grade in the class.

Rating Scale:
4 - Skilled - can work independently with no supervision.
3 - Moderately skilled - can perform job completely with limited supervision.
2 - Limited skilled - requires instruction and close supervision.
1 - No exposure - no experience or knowledge in this area.

1. ***Understand matter and heat behavior***
    a. Define the three states of matter
    b. Define molecular movement
    c. Observe change of state
    d. Perform temperature conversions using Celsius, Fahrenheit and Kelvin scales
    e. Solve problems using the First Law of Thermodynamics
    f. Solve problems using the Second Law of Thermodynamics
    g. Define convection, radiation, insulation and apply these principles to problems

2. ***Have knowledge of fluids and pressure***
    a. Define fluid pressure and apply the formula in practical problems
    b. Solve problems using Pascal's Principle
    c. Solve problems involving density and specific volume
    d. Measure atmospheric and other pressures using manometers
    e. Define absolute pressure
    f. Apply gas expansion laws to specific problems

3. ***Have knowledge of refrigeration piping, materials and fabrication***
    a. Differentiate between the various types of copper tubing and other refrigerant tubing

b. Perform tube bending and cutting
c. Mechanically join tubing using a variety of couplings
d. Flare tubing, installing compression fittings
e. Demonstrate soft and hard soldering and swaging
f. Heat and flow soft solder
g. Braize silver solder

4. *Understand the purpose and uses of various hand tools*

a. Exhibit the ability to choose the proper tool for a specific task
b. Display the ability to use all tools safely and in a prescribed manner

5. *Know the compression cycle components*

a. Define the evaporators (cooling coil) and demonstrate their use in the compression cycle
b. Define the differences in compressors
c. Disassemble and reassemble a compressor
d. Define and identify condensers
e. Disassemble and reassemble, so far as is possible, a condenser
f. Identify and demonstrate the use of refrigerant flow control systems
g. Check refrigerant lines and connections using leak detection instruments

6. *Fully understand the flammability and explosive nature of refrigerant systems*

a. Detect leaks and use proper techniques for reducing pressure
b. Repair or mend leaks
c. Define critical pressure and temperature
d. Define the physical properties of various refrigerants
e. Classify refrigerants according to color-codes
f. Check and maintain proper refrigerant oil levels

7. *Understand pressure - enthalpy diagrams*

a. apply pressure-enthalpy principles to problems
b. Employ coefficient of performance to problems
c. Define and use capacity in specific problems

8. *Understand the use of refrigeration measuring and testing equipment*

a. Exhibit the use of the various types of thermometers

b. Demonstrate the use of pressure measurement instruments
c. Demonstrate the use of leak detection equipment
d. Define purging and evacuation and use them on a system
e. Identify various vacuum pumps and show their relationship to the system
f. Demonstrate the use of a roughing pump
g. Demonstrate the use of a piston pump
h. Observe the operation of a Roots pump and explain its operation
i. Observe the operation of a diffusion pump and explain its operation
j. Observe the operation of a turbo-molecular pump and explain its operation
k. Observe the operation of an ion pump and explain its operation
l. Define mechanical vacuum gauges, Pirani gages and Ionization gages
m. Recognize acceptable and unacceptable materials for vessels and piping
n. Recognize various types of gasket materials and explain their uses
o. Recognize various structural materials for cryogenics and explain their application
p. Demonstrate the ability to read a structural strength of materials chart for cryogenic temperatures
q. Define entropy
r. Recognize that nitrogen and helium, when liquefied, do not perform as other refrigerants and that they require special handling
s. Define the expansion/compression process in the entropy of a system
t. Demonstrate the ability to read a process diagram for a liquification cycle

9. *Understand control devices*

a. Demonstrate the use of automatic expansion valves, thermostatic expansion valves, capillary tubes, low-side floats and high-side floats

10. *Understand refrigeration loads*

a. Apply heat transfer formulae to specific problems
b. Calculate the problems using the latent heat of freezing
c. Apply ds=d0/T (a measure of the capacity of a system to undergo spontaneous change) to specific problems

Competencies for Metallurgy/Materials Testing IT 2114

Directions: Evaluate the student using the rating scale below. Mark the appropriate number to indicate the degree of competency. The rating for each of the competencies should reflect job readiness rather than the grade in the class.

Rating Scale:
4 - Skilled - can work independently with no supervision
3 - Moderately skilled - can perform job completely with limited supervision.
2 - Limited skilled - requires instruction and close supervision.
1 - No exposure - no experience or knowledge in this area.

1. ***Understand properties of metals and tests to determine their uses***
   a. Define metallurgy.
   b. Recognize the properties of metals and their consequent uses.
   c. Apply the coefficient of expansion to selected problems.
   d. Define specific gravity and solve problems involving its use.
   e. Relate electrical resistance to the properties of certain metals.
   f. Define mechanical properties and utilize these properties to solve specific problems.
   g. Evaluate the composition of metals including their strength and plasticity/elasticity.
   h. Perform tensile tests.
   i. Measure hardness using a Rockwell or Brinell tester.
   j. Define and read the Mohs Scale.
   k. Perform corrosion tests and evaluate the results.
   l. Perform microscopic tests.
   m. Perform fracture tests.
   n. Define the principle of Macro-etching.
   o. Define magnetic testing using the magnaflux method.
   p. Demonstrate the spark test on an unknown type of steel.
   q. Define x-ray testing.
   r. Demonstrate the ability to use a thermoelectric pyrometer.

2. ***Have a knowledge of chemical metallurgy***

   a. Identify samples of various alloys.

   b. Show examples of non-ferrous metals.

   c. Define methods for refining non-ferrous metals.

   d. Display samples of more exotic metals such as tungsten, antimony, etc.

   e. Demonstrate the ability to recognize various metals and to define the properties that permitted this recognition.

3. ***Understand iron and steel production***

   a. Define the "basic oxygen" process of steel production.

   b. Define founding.

4. ***Understand physical metallurgy***

   a. Define metallic state.

   b. Define solid or crystalline state.

   c. Show examples of cleavage and slip planes

   d. Practice metal deformation.

5. ***Understand the theory of alloys***

   a. Perform tests on metals showing thermal cures and time-temperature curves.

   b. Define the five (5) types of freezing of alloys.

   c. Read curves relating to the freezing of alloys in five ways.

   d. Define Ternary Alloy and read a chart displaying the composition.

   e. Read a critical temperature diagram.

6. ***Understand shaping and forming metals***

   a. Define casting, hot rolling and hot working.

   b. Forge a piece of steel.

7. ***Understand light metals and copper and their alloys***

   a. Define and describe the structure and identify light metals such as aluminum and magnesium.

   b. Define and describe the structure and identify copper and its alloys.

8. ***Have knowledge of the various types of steel***

   a. Define and describe the structure of steel and identify the varieties of steel.

b. Select various steels for assorted applications.
c. Recognize hardened carbon steel.
d. Define the principles of hardened steel and the quenching process.
e. Define the effects on hardness by varying the temperature.
f. Recognize warping and cracking.
g. Define and explain the process of tempering.
h. Define normalizing and annealing.

9. *Understand surface treatments*

a. Explain plating and identify examples of plated steel.
b. Define flame hardening and identify examples.
c. Define case carburizing and hardening and identify examples.
d. Define the behavior and influence of a special element on steel.
e. Recognize chromium steel and define its properties.
f. Recognize tungsten steel and define its properties and applications.
g. Recognize manganese steels and define their properties
h. Recognize molybdenun steels and high speed steels and define their properties and applications.
i. Recognize vanadium and silicon steels and show their uses.
j. Define magnet steels and identify properties.

10. *Understand classification of steels*

a. Define SAE steels and give examples of the numbering system.
b. Define NE steels and give examples of the numbering system.

11. *Understand powder metallurgy*

a. Recognize, describe and define selected metallic powders.
b. Describe the molding of metal powders.

12. *Understand properties of titanium, zirconium, indium, vanadium and other exotic metals*

a. Recognize, describe and define selected exotic metals.
b. Demonstrate uses of exotic metals.
c. Describe health hazards, fire hazards and handling of exotic metals.

Competencies for Basic Hydraulics and Fluid Mechanics IT 2124

Directions: Evaluate the student using the rating scale below. Mark the appropriate number to indicate the degree of competency. The rating for each of the competencies should reflect job readiness rather than the grade in the class

Rating Scale:
4 - Skilled - can work independently with no supervision.
3 - Moderately skilled - can perform job completely with limited supervision.
2 - Limited skilled - required instruction and close super- vision.
1 - No exposure - no experience or knowledge in this area.

1. ***Understand the advantages and applications of hydraulic power***

   a. List five (5) advantages of hydraulic power.

   b. List five (5) examples of the application of hydraulic power

2. ***Understand the typical hydraulic system***

   a. Describe the consequences of Pascal's Law

   b. Solve problems using the basic mathematical relationship of pressure, force and area, solving for one when given the other two.

3. ***Understand the principles and concepts of fluid pressure and flow***

   a. Calculate the pressure head for a given fluid height when given the density or specific gravity of a fluid.

   b. State Bernoulli's Theory in terms of velocity and pressure.

   c. Solve the Continuity Equation for velocity or cross-sectional area given the initial velocity and size of conductor or given the flow rate.

   d. State the results of Torricelli's Theories in terms of pressure head and velocity.

e. Calculate Reynold's Number to determine laminar or turbulent flow in a steady flow situation.

f. Calculate pressure drop in hydraulic lines given fluid velocity, viscosity, density and size of lines.

g. Given the movement of a load in a given time interval, calculate work, power and horsepower.

4. *Understand types, properties and safety of hydraulic systems*

a. Name three (3) types of hydraulic fluid.

b. List two (2) methods of measuring fluid viscosity.

c. List four (4) desirable characteristics of a hydraulic fluid.

d. Given a hypothetical hydraulic system configuration, identify the safety hazards and means of correcting.

e. List (5) features of a well-designed hydraulic reservoir.

f. Given the operating condition, calculate estimated fluid temperature rise in a hydraulic system.

g. Name two (2) types of heat exchangers.

h. Name three (3) basic types of filter elements.

i. Name three (3) general classes of filter elements.

j. Define micron rating of filters.

k. List three (3) benefits derived from proper conditioning of hydraulic fluid.

5. *Understand distribution and sealing devices*

a. Given the pressures and flow rate of a system, select the correct tubing size for a properly designed hydraulic system.

b. Shown actual or illustrated hose installations, identify improper installation and recommend an acceptable configuration.

c. Shown actual or illustrated tubing connectors, properly identify them within the two (2) main classifications.

d. Using Barlow's Formula, or a proper reference chart, determine the allowable maximum pressure of a given conductor.

e. Determine working pressure of a system given the safety factor.

f. Using Darcy's Formula, calculate the pressure drop of a given length of conductor.

g. Given the flow parameters of velocity, viscosity, density and conductor diameter, calculate the Reynold's Number and determine whether the flow is laminar or turbulent.

h. Using a nomograph, determine the flow rate, conductor size or flow velocity given any two parameters.

i. Determine hydraulic pump inlet and discharge line size given the flow rate.

j. List three (3) conditions affecting the selection of sealing devices.

k. Name the three (3) general categories of sealing materials.

l. Given the name of a seal, sketch its cross-section or select the proper seal from a mix of actual seals.

6. *Understand pumps*

a. Name the two (2) general classifications of pumps.

b. List the design features, main uses and describe the operation of each of the two types of pumps.

c. Calculate the theoretical output flow and input torque of a pump.

d. Determine overall pump efficiency.

e. Determine the volumetric efficiency of a pump.

f. Determine the mechanical efficiency of a pump.

g. Name two (2) types of fixed delivery pumps.

h. Name three (3) types of positive displacement pumps; list the advantages/disadvantages of each.

i. Name two (2) types of variable delivery pumps.

j. List at least 10 of the 15 most important considerations for pump selection.

7. Have knowledge of hydraulic controls

a. Name the three (3) primary types of hydraulic controls.

b. Describe the operation of a pressure control valve; name three (3) types or uses.

c. Describe the operation of a directional control valve; name the three (3) types or designs.

8. Understand linear actuators (cylinders)

a. Name the two (2) classifications of cylinders.

b. Name the two (2) ways cylinders are rated.

c. Using an illustration or actual cylinder, name and identify the parts.

d. Given the size of a cylinder and the system flow rate, calculate the cylinder extension speed.

e. Given system flow and pressure, or load, stroke and extension time, calculate the power output of a cylinder.

9. Understand rotary actuators and motors

a. Name the two (2) general classes of hydraulic motors.

b. Name the three (3) principle elements of motor ratings.

c. Given displacement and flow rate, calculate motor speed (rpm).

d. Given the torque and rpm of a motor, calculate the hydraulic horsepower.

10. *Understand hydraulic troubleshooting*

a. Define component relationships

b. Given a real or hypothetical hydraulic system, trace flow through the entire system, state the purpose of each component, and describe the action or operation of each component at each control setting.

c. Name the three (3) common terms used when referring to pressure within a hydraulic system.

d. Describe the causes of each of the three kinds of system pressure.

e. Describe the effect of increased or decreased flow on actuator operation.

f. Describe the effect of increased or decreased pressure on actuator operation.

g. Describe two (2) ways of determining the problem with a malfunctioning hydraulic system.

h. Given the fault in a malfunctioning hydraulic system, describe the component relationships.

i. Make a list of possible causes for the malfunctioning of the given system.

j. Given the specification of a hydraulic system, compare them to actual or hypothetical measurements.

k. Given a malfunctioning hydraulic system, following a logical troubleshooting sequence, trace the problem to its origin.

11. *Understand the value of maintenance*

a. List three (3) general requirements for a good maintenance program.

b. In addition to a proper set of mechanics tools and gages, list two (2) other factors which are considered "tools" for good maintenance.

c. List at least three (3) types of records used to insure proper preventive maintenance.

12. Understand the necessity for safety

a. List five (5) safety rules for the operator of fluid power machinery.

b. List five (5) safety rules for the fluid power mechanic.

ATTACHMENT F

NAVARRO COLLEGE
ACADEMIC COUNCIL (CURRICULUM COMMITTEE) INFORMATION SHEET
For the Addition of Courses/Programs

Course/Program Name: Industrial Technology **Date:** 10/18/90

This information sheet should be completed in its entirety before the Curriculum Committee will consider the curriculum proposal.

Please check the appropriate request.

_____Course Request __X__Program Request (Program Packet Attached)

Please respond to the following questions.		YES	NO
1.	Will additional faculty be necessary to teach this course/program?		X
2.	Are library resources adequate to satisfy the needs of this course/program?	X	
3.	Has an adequate syllabus been prepared for this course/program?		X
4.	Will the approval of this course/program require the purchase of additional equipment?	X	
	Will the approval of this course/program require additional space?		X
5.	Is this course/program entirely new? (Never been in the curriculum before.) Option to Industrial Maintenance	X	
6.	Have you consulted with the chairperson of all divisions directly affected by this change?	X	
	Nave of divisions: Science, Math, English, Social Science, and Speech.		
7.	Will the addition of this course/program replace another course/program in your curriculum? (Name of course/program deleted: _____)		X
	How often would this course/program be offered? Every semester: 2-year program		
8.	If this proposal concerns a new course/program name or number (or a change in existing name or number), have you communicated with the Registrar regarding use of the course/program name and number you are proposing? (10/17/90)	X	
9.	Does this proposal for curriculum change concern a general education course?	X	
	Is this to be a major/degree requirement?	X	
	Indicate major and degree: Industrial Technology (A.A.S.)		
10.	Is regional approval required if a course is to be offered off-campus?	X	
11.	Is a lab fee required?		X

ATTACHMENT G

TEXAS HIGHER EDUCATION COORDINATING BOARD

APPLICATION FOR PROGRAM REVISION

(Submit in Duplicate)

Navarro College
Institution

003593
FICE Code

6261
HEGIS Code

Corsicana, TX
Campus

CIP Code

1. Program Title: Industrial Technology

2. Program Credential: (X) Associate Degree ( ) Certificate

3. Items to be Revised (Check all that apply):

( ) Title of Program, Option, or Exit Point
(X) Option (Addition or Deletion)
( ) Exit Point (Addition or Deletion)
( ) Program Credential (From AAS to Certificate only)
( ) Program Objectives
( ) Program Length (Weeks, Quarters, or Semester)
(X) Courses (Addition to or Deletion from Program)
( ) Credit Hours (Total for Program)
( ) Contact Hours (Total for Program)
( ) Course Prefix, Number, Title, Lecture Hours, Lab Hours, Contact Hours, or Credit Hours
(X) Course Descriptions
( ) Other _____

4. Date Revision to be Effective: Summer, 1991

5. Attach Reason for each Revised Item.

6. Attach Advisory Committee Meeting Minutes

Robert M. McKenzie, Dean of Business & Technology
Authorized School Official (Name and Title)

Signature

Date

903-874-6501
Telephone

FOR THECB USE ONLY

( ) Approved ( ) Approved with Provision ( ) Disapproved

Reviewed By

Approved by Assist. Commissioner
Community Colleges & Tech. Institutes

Date

Attachments:

1. Brief statement indicating need for this course/program.
2. Topical outline and brief statement of course/program objectives.
3. Coordinating Board forms.

	Approve	Reject		Approve	Reject
_____ (Chairperson's Signature)	_____	_____	_____ (Signature of the Dean)	X	_____
_____ (Signature of Chairperson of Division affected by this change, if applicable)	_____	_____	_____ (Signature of the Vice President for Instruction)	_____	_____

Distribution instructions: Send a copy of PROPOSAL FOR CURRICULUM via Division Chairperson, Dean, and Vice-President for Instruction. The Vice-President for Instruction will forward it to the Curriculum Committee.

ATTACHMENT H

FORM APR-A FICE CODE: 003593

TITLE AND CREDENTIAL CHANGES

Current Program Titles and Credentials

Degree Title: Industrial Maintenance - A.A.S.

Options, if any: _____

_____

Existing Points, if any: _____

_____

Certificate Title: _____

Options, if any: _____

_____

Existing Points, if any: _____

_____

Proposed Program Titles and Credentials

Degree Title: Industrial Maintenance

Options, if any: Industrial Technology - A.A.S.

_____

Exit Points, if any: _____

_____

Certificate Title: _____

Options, if any: _____

_____

Exit Points, if any: _____

_____

FICE Code: 003593

REASON FOR REVISION

The arrival of the Superconducting Super Collider is spurring growth (economic, population, technology, etc.) in this area. It is located in Ellis County, and this is in the area served by Navarro College. Since Navarro College was chosen as a clearinghouse for all educational activities associated with the SSC and is serving as the lead institution in identifying current SSC related materials and in brokering curriculum development, pilot testing and disseminating educational materials and, further, will track those students trained through the developed curricula, it follows naturally that a curriculum to satisfy entry-level competencies for SSC technicians and related support or spin-off industries should be developed.

After several meetings with SSC engineers and management, it was decided that a curriculum in Industrial Technology should be designed to meet their needs. Since many elements in the Industrial Maintenance program coincided with the Industrial Technology curriculum, it was felt that revision would be the most practical method of implementing the new program. This program is broad enough that it should enable our students to go to work for many industries other than the SSC.

ATTACHMENT I

COURSE ADDITIONS

New Courses Added to Program and Course Inventory

Funding: Tech Voc	Funding: Gen Acad	Course Prefix	Course Number	Course Title	Hours: Lecture	Hours: Lab	Hours: Contact	Hours: Credit
X		IT	2023	Intro. to Quality Control	3	0	48	3
X		IT	2114	Metallurgy/Mat. Text	3	3	96	4
X		IT	2014	Measurements/Metro.	3	3	96	4
X		IT	2124	Basic Hydr./Fl. Mech.	3	3	96	4
X		IT	2033	Basic Circuits	3	0	48	3
X		IT	2044	Indus. Refr. Prin.	3	3	96	4

Currently Approved Courses to be Added to Program

Funding: Tech Voc	Funding: Gen Acad	Course Prefix	Course Number	Course Title	Hours: Lecture	Hours: Lab	Hours: Contact	Hours: Credit
X		IE	1013	Engr. Drawing I	3	3	96	3
	X	Math	1213	College Algebra	3	0	48	3
X		DD	1013	Computer Aided Draft.	3	3	96	3
	X	Engl	1033	Technical Writing	3	0	48	3
	X	PhSc	1024	Physical Science	3	3	96	4
	X	Math	1223	Plane Trigonometry	3	0	48	3
	X	Spch	1133	Business Speaking	3	0	48	3
	X	Phys	1114	College Physics	3	3	96	4
X		CS	1034	Current Micro Software	3	3	96	4
	X	Engl	1013	Comp. & Rhetoric I	3	1	64	3

COURSE ADDITIONS

New Courses Added to Program and Course Inventory

Funding: Tech Voc	Funding: Gen Acad	Course Prefix	Course Number	Course Title	Hours: Lecture	Hours: Lab	Hours: Contact	Hours: Credit

Currently Approved Courses to be Added to Program

Funding: Tech Voc	Funding: Gen Acad	Course Prefix	Course Number	Course Title	Hours: Lecture	Hours: Lab	Hours: Contact	Hours: Credit
	X	Psy	1011	Education & Career Plan.	1	0	16	1
	X	Psy	1213	General Psychology	3	0	48	3

ATTACHMENT J

FORM APR-E FICE Code: 003593

COURSE REVISIONS

	Course Prefix	Course Number	Course Title	Lec Hrs	Lab Hrs	Cont Hrs	Credit Hrs
Current	I E	1144	General Metal	3	3	96	4
Proposed	I T	1144	General Metal	3	3	96	4

Current Description:

Introductory course in metalwork, including work with basic tools in hot and cold metalmaking.

Proposed Description:

Introductory course in metalwork, including work with basic tools used in hot and cold metalworking to include silver-soldering and TIG welding techniques integrated into metal fabrication.

NAVARRO COLLEGE
1990

INDUSTRIAL MAINTENANCE -- Inactive

COURSE	NO.	COURSE NAME	LEC	LAB	CONT	CR
FALL						
WELD	1014	Gas Welding	2	4	96	4
ELEC	1014	Direct Current Analysis	3	3	96	4
ENGL	1013	Composition and Rhetoric I	3	1	64	3
MATH		Approved Elective	3	0	48	3
WELD	1024	Arc Welding I	2	4	96	4
PSY	1011	Educational & Career Planning	1	0	16	1
		Total Hours:	14	12	416	19
SPRING						
ELEC	1034	Alternating Current Analysis	3	3	96	4
DD	1023	Blueprint Reading	2	2	64	3
IMT	1014	Elements of Mechan. & Gearing	3	3	96	4
IMT	1023	General Plumbing & Piping	2	3	80	4
CS		Approved Elective	3	3	96	4
		Total Hours:	13	14	432	19
FALL						
ELEC	1044	Digital Equipment	3	3	96	4
IE	1144	General Metal	3	3	96	3
WELD	2054	Special Alloys	2	4	96	4
PSY	1213	General Psychology	3	0	48	3
		Total Hours:	11	10	336	14
SPRING						
ELEC	1064	Microprocessor Architecture	3	3	96	4
EL		Approved Elective	3	0	48	3
SPEECH	1113	Fundamentals of Speech	3	0	48	3
IMT	2022	Natl. & State Electric Codes	2	0	32	2
HUM		Hum/Fine Arts/Math/Soc. Science	3	0	48	3
		Total Hours:	14	3	272	15
		Grand Total:	**52**	**39**	**1456**	**67**

ATTACHMENT K

COURSE DEVELOPMENT WORKSHEET

1. Number_____

2. Title _____

3. Description:

4. Student Performance Objectives:

5. Course Contact and Credit Time:

   A. Credit_____
   B. Contact Time_____
      (1) Lecture_____/week
      (2) Laboratory_____/week
      (3) Discussion, quiz, recitation _____/week
   C. Course Length_____ weeks

6. Topic Outline: (Major Units of Instruction)

   A. _____% Time
      (1)
      (2)
      (3)
   B. _____% Time
      (1)
      (2)
      (3)
   C. _____% Time
      (1)
      (2)
      (3)
   ETC. Total = 100% Time

7. Course Prerequisites:

SAMPLE PROGRAM FORMAT

First Year

Semester 1:
(Listing of Courses)

Semester 2:
(Listing of Courses)

Second Year

Semester 1:
(Listing of Courses)

Semester 2:
(Listing of Courses)

NOTE: Add remaining breakdowns as may be required if program is longer than two years.

BUDGET FORM FOR CAREER PROGRAMS

PROGRAM _____ YEAR _____

Estimated New Revenue

1. Student tuition (if any)	$_____
2. Student fees	$_____
3. State apportionment	$_____
4. State vocational reimbursement	$_____
5. Chargebacks	$_____
6. Total tax support	$_____
7. Other	$_____
Total additional revenue	$_____

Estimated New Expenditures

1. Direct salaries (full and part-time)	$_____
2. Contractual services	$_____
3. Travel	$_____
4. Supplies	$_____
5. Instructional equipment	$_____
6. Learning Resource Center	$_____
7. Construction, renovation, and/or rental of physical facilities	$_____
8. Other	$_____
Total additional expenditures	$_____
Balance	$_____

ROOM SCHEDULE

Semester ____ Year ____
Room Number ____

Department _____

Time Blocks	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

INSTRUCTOR SCHEDULE

Semester ____ Year ____
Instructor _____

Department _____

Time Blocks	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

DEPARTMENT SCHEDULE

Semester ____ Year ____

Department _____

Section Number	Department	Course Number	Course Title	Time	Days	Instructor	Room No.	Lec. Hrs.	Lab. Hrs.	Credit Hours

INSTRUCTIONAL METHODOLOGY AND MEDIA DETERMINATION CHART

COURSE NUMBER AND TITLE _____

Objectives (Code by Numbers)	Instructional Methodology (Please Check)						Media To Be Used (Please Check)						
	Lecture-Discussion	Audiovisual Tutorial	Demonstration	Laboratory Practice	On-the-Job Work Experience	Slides	Chart	Programmed Instruction	Transparency	Testbook	Film	Computer	Filmstrips

INSTRUCTIONAL EQUIPMENT AND MATERIALS LOG

COURSE NUMBER AND TITLE

DIRECTIONS: This form is designed to be completed for each course. Review the course objectives and instructional methodology as the basis for determining the necessary equipment and materials.

I. Number of Students Per Course _____

II. Equipment:

Quantity	Equipment Description	Estimated Cost	Recommended Vendor	Already on Hand	Need to Purchase	Priority Rating

III. Instructional Materials:

Quantity	Description	Estimated Cost	Recommended Vendor	Student Use	Instructor Use	Need to Purchase	To Be Locally Developed	Already on Hand	Priority Rating

STAFF QUALIFICATIONS WORKSHEET

1. POSITION TITLE:

2. WORK EXPERIENCE:
   A. Number of Years:
   B. Type of Work:

3. PROFESSIONAL EDUCATION:
   A. Minimum Education Attainment (Degree or Certification):
   B. Major(s) Preferred:

4. TEACHING EXPERIENCE:
   A. Number of Years:
   B. Grade Level, Subjects Taught, Etc.:

5. OTHER SPECIAL REQUIREMENTS:
   A. Licensure, Certification, Etc.:
   B. Personality Characteristics:

APPLICATION FOR CREDIT BY EXAMINATION
CAREER PROGRAMS

A. PERSONAL DATA

Name _____
Mr, Mrs. or Miss Last First Middle

Present Address _____
Street and Number City State Zip Code

Date of Birth _____ Date of Application _____

Course(s) for which applicant requests credit _____

B. HIGH SCHOOL

Name and location of high school attended _____

Number of years completed _____ Were you granted a diploma? _____

C. COLLEGE OR UNIVERSITY (if any)

Name and Location of College or University Attended	Inclusive Dates Attended	Degree Conferred	Number of Hours of College Credit		Major-Minor Subjects
			Semester	Term	

D. SPECIAL TRAINING

Did you serve an apprenticeship? _____ For what trade? _____

For how many years? _____ Name of Company _____

Address _____

Please list any other special training you have completed in the military, industry, private school, etc.

E. WORK EXPERIENCE

Important Instructions: List below all full-time and part-time employment or occupational experience in reverse chronological order, starting with current or latest employment at top of list.

Dates of Employment		Length of Employment in Months	Average Hours Worked Per Week	Title or Position; State Specific Job or Position	Name and Address of Employer	Describe Duties and Nature of Work Including Supervisory Responsibilities, if any
From Month Year	To Month Year					

Total Months _____

97

F. REFERENCES

List names of three persons qualified to vouch for your practical work experience.

Name	Position	Address

Please write additional qualifications and experience on the back of this sheet.

Signed _____ Date _____
(Applicant)

EXAMINATION DATA Name _____ Student Number _____

PLEASE DO NOT WRITE FURTHER ON THIS SHEET - FOR SCHOOL USE ONLY

INSTRUCTOR EVALUATION

APPROVED FOR EXAMINATION: _____
Course(s)

Signed _____ Date _____
Department Chairman

Signed _____ Date _____
Director

EXAMINATION RESULTS

WRITTEN:

ORAL:

PERFORMANCE:

Signed _____ Date _____
Examining Instructor(s)

APPROVED FOR CREDIT

COURSE(S)	CREDIT

Signed _____ (Director) Date _____

Copies to: Student
Records Office
Department Office

APPENDIX D

Project Networking

NAVARRO COLLEGE/DALLAS COUNTY COMMUNITY COLLEGE DISTRICT SUPERCONDUCTING SUPER COLLIDER PROJECT NETWORK

National

SSC:
Sherri "Sam" Kivlighn
Manager, Educational Programs

Russ Wylie, External Affairs

Gary Damiano, Personnel Manager

Jim Gray, MDL Project Manager

Department of Energy:
Debbie Abrahamson, SSC Project Office

Congressman
Joe Barton

Congressman
John Bryant

College of DuPage:
Mary Patino

IASSC

IISSC

Hammond Tech. Inst.:
Frances Bickham

State of Tennessee:
Lynne Cohen

State of Louisiana:
Gerald Saucier

Brookhaven Lab:
Don Metz

State

Coordinating Board:
Eduardo Gaytan
Larry Johnson
Sally Andrade

Governor's Office
State JTPA Council:
Celeste Guerrero

TNRLC:
Lynn Bowers

University of Houston:
Curtis Johnson, Co-Director

Lawrence Wolf, Co-Director

TEC:
Kenneth E. Heflin, Area Manager

TSTI:
Dr. Robert Krienke
Vice Chancellor/
Educational Services

Doug Hunter, Instructor
TSTI Sweetwater

Starlink:
Ron Thompson, Austin Director

Henry Hartman, Dallas Director

Department of Labor:

Department of Commerce

Regional

Interlink:
Dan Arguijo, Project Director

Hotlink:
Elizabeth Smith
Director

NTCOG:
Bob O'Neil, Director
Regional Data Center

Alyssa Jenkens
Economic Planner II

NTC
Rick Douglas

Argonne Natl. Lab:
Shari Zussman
Bob Darraugh
Diane Fitzpatrick

Fermi Lab:
Dick Carrigan
Marge Bardeen

County

Commissioner:
Penny Reddington

Ellis County Personnel Association:
Kenneth E. Heflin, Area Manager

Ellis County Planning and Zoning Commission
Marcus Hickerson

Johnson, Johnson & Roy
J. Micheal Gay, ASLA
Senior Assistant

Ellis County SSC Forum:
Troy Rogers

Hill County Community College:
Al Boehm

Tarrant Co. Community College:
Faye Murphy

Trinity Valley Comm. College:
Jack King

Paul Quinn College:
Charles Humphreys

Local

Waxahachie Chamber of Commerce:
W.B. "Buck" Jordan
Executive Director

Ennis Chamber of Commerce:
Ms. Jane Thrailkill
Executive Director

Midlothian Chamber of Commerce:
Ms. Pam Mundo
Executive Director

Private Sector

Parsons Brinkerhoff/ Morrison Knudsen:
Mr. Lloyd Henderson,
Human Resources

Texas Instruments:
Sam Webster

Koch Quadrapole Magnets:
Rich Gonzalez

SBDC:
Gary Burns, Director

Bonnie Franke-Hill,
Vice Provost, BJP

Westinghouse Electric Corporation:
Doug Smith, Purchasing Manager

Rochelle L. Jones,
Buyer, SBD Coordinator

General Dynamics:
Garrison O. (Gary) Gigg
Materials Manager

Center for Government Contracting:
Bonnie Franke-Hill,
Vice Provost

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1. Dept. of Energy
Debbie Abrahamson
SSC Project Office
1801 N. Hampton, Suite 310
DeSoto, TX 75115

Member:
Navarro College/DCCCD Project Advisory Committee.

214-708-2528
214-708-2504 (FAX #)

The umbrella agency responsible for funding the SSC.

2. SSC Laboratory
2550 Beckleymeade Avenue
Dallas, TX 75237

Sherrie "Sam" Kivlighn
Manager, Educational Programs

Member:
Navarro College/DCCCD Project Advisory Committee.

Russ Wylie, External Affairs
Contact for SSC manpower statistics

Gary Damiano, Personnel Manager
Contact for current SSC employment openings.

Jim Gray, MDL Project Manager
Contact for curriculum in magnet technology.

214-708-1066
214-708-0000 (FAX#)

3. INTERLINK
Dan Arguijo, Project Director
8445 Freeport Parkway, Suite 640
P.O. Box 610246
DFW Airport, TX 75261-0246

Member:
Navarro College/DCCCD Project Advisory Committee

214-621-0400
214-929-0916 (FAX#)

4. Texas Instruments
Sam Webster, Manager
Education Programs

Member:
Navarro College/DCCCD Project Advisory Committee
Private Industry Council
INTERLINK

214-917-7265

5. County Commission
Penny Reddington
Waxahachie Court House
Waxahachie, TX 75165

Contact for ancillary employment opportunities

214-937-8620

Approving agency for Ellis County Planning and Zoning Commission plan. Document to be delivered to County Commission by January '92.

6. State of Texas
Celeste Guerrero

Appointee to the State Job Training Coordinatin Council.

Member:
Navarro College/DCCCD Project Advisory Committee

214-526-6428

7. Waxahachie Chamber of Commerce
N.B. "Buck" Jordan
Executive Director
P.O. Box 187
Waxahachie, TX 75165

Member:
Navarro College/DCCCD Project Advisory Committee

214-937-2390

8. Ennis Chamber of Commerce
Ms. Jane Thrailkill
Executive Director
P.O. Box 1177
Ennis, TX 75120

Local contact for Ennis.

214-875-2625

9. Midlothian Chamber of Commerce
Ms. Pam Mundo
Executive Director
100 East Avenue E
P.O. Box 609
Midlothian, TX 76065

Local contact for Midlothian.

214-775-8500

10. N. Central Texas Council of Governments
Bob O'Neal, Director
Regional Data Center

Contact for regional manpower statistics.

Lyssa Jenkens
Economic Planner II
Economist for the manpower study.

Member:
Navarro College/DCCCD Project Advisory Committee.

817-640-3300

11. Texas Employment Commission
Kenneth E. Heflin
Area Manager
105 Grand
Waxahachie, TX 75165

Contact for Ellis County ancillary employment opportunities.

214-937-8114

12. Ellis County Personnel Association
Kenneth E. Heflin
105 Grand
Waxahachie, TX 75165

Contact for Ellis County ancillary employment opportunities.

This Association is made up of Ellis County people who hire for ancillary jobs in Ellis County. They meet once a month and discuss common problems in personnel, hiring, insurance, etc.

13 University of Houston
SSC Technology Proj. Advisory Committee
Dr. Curtis D. Johnson, Co-Director
Dr. Lawrence Wolf, Co-Director
Houston, TX 77204-4083

Member:
Navarro College/DCCCD Project Advisory Committee

713-749-3618
713-747-8017 (FAX#)

University of Houston developed the handbook c SSC technology.

14. TSTI
Dr. Robert Krienke
Vice Chancellor
Educational Services
TSTI System

Member:
Navarro College/DCCCD Project Advisory Committee

817-799-3611

Doug Hunter
Instructor
CMT Department
TSTI - Sweetwater

Curriculum consultant and contact for TSTI programs.

915-235-7398

15 State of Texas Academic Resources LINK (STARLINK)

Ron Thomson	Henry Hartman
Austin Director	Dallas Director
Austin Comm. College	DCCCD
P.O. Box 140526	701 Elm
Austin, TX 78714	Dallas, TX 75202

Contacts for STARLINK productions.

512-483-7776
512-483-7786 (FAX#)

16. Parsons Brinckerhoff /Morrison Knudsen
Mr. Lloyd Henderson
Human Resources
7220 South Westmoreland Rd.
Dallas, TX 75237

Contact for industry employment and cooperative education opportunities.

214-709-0900
214-709-0014 (FAX#)

The engineering/construction management team for the SSC.

17. Ellis County Planning & Zoning Commission
Marcus Hickerson
201 Overhill
Waxahachie, TX 75165

Contact for land development use.

214-937-0504

The only Planning and Zoning County-wide in the state. Involved with planning for land use and attracting industry into Ellis County

18. Johnson Johnson & Roy
J. Michael Gay, ASLA
Senior Associate
2828 Routh Street, Suite 600
Dallas, TX 75201

Contact for ancillary employment opportunities.

214-871-9220
214-871-7643 (FAX#)

Works for Ellis County Planning and Zoning and paid by TNRLC.

19. Texas National Research Laboratory Commission (TNRLC)
Dr. Lynne Bowers
1801 N. Hampton Rd., Suite 400
DeSoto, TX 75115

Member:
Navarro College/DCCCD Project Advisory Committee.

214-709-3800
800-228-3972
214-709-5491 (FAX#)

The Texas commitment of $1 Billion of state funds toward the total cost of the SSC.

20. Ellis County SSC Forum
Troy Rogers
1203 W. Ennis Avenue
Ennis, TX 75119

Contact for SSC bid and procurement.

214-875-9058

The organization which sets up the meetings in the county for small businesses who want to bid on SSC contracts.

21. IASSC
Industry Association for the
Superconducting Super Collider
1050 Thomas Jefferson St., N.W., 7th Floor
Washington, D.C. 20007

Contact for federal government information.

202-625-0496
202-338-2416

This is a political lobbying group in D.C. Their newsletter is excellent and often gives more detail about the SSC in Ellis County than we get elsewhere. We have joined this association. They meet in Washington quarterly and is where the SSC itself finds out information first-hand.

22. IISSC
International Industrial Symposium on the Super Collider
Ms. Pamela E. Patterson
Conference Manager
P.O. Box 171551
San Diego, CA 92197

Contact for business and industries to do business with the SSC.

Voluntary, non-profit organization whose purpose is to convene an annual symposium on the SSC. Third annual meeting was held in Atlanta, March 13-15, 1991. Project attended and hopes to give a paper next year on findings of this project.

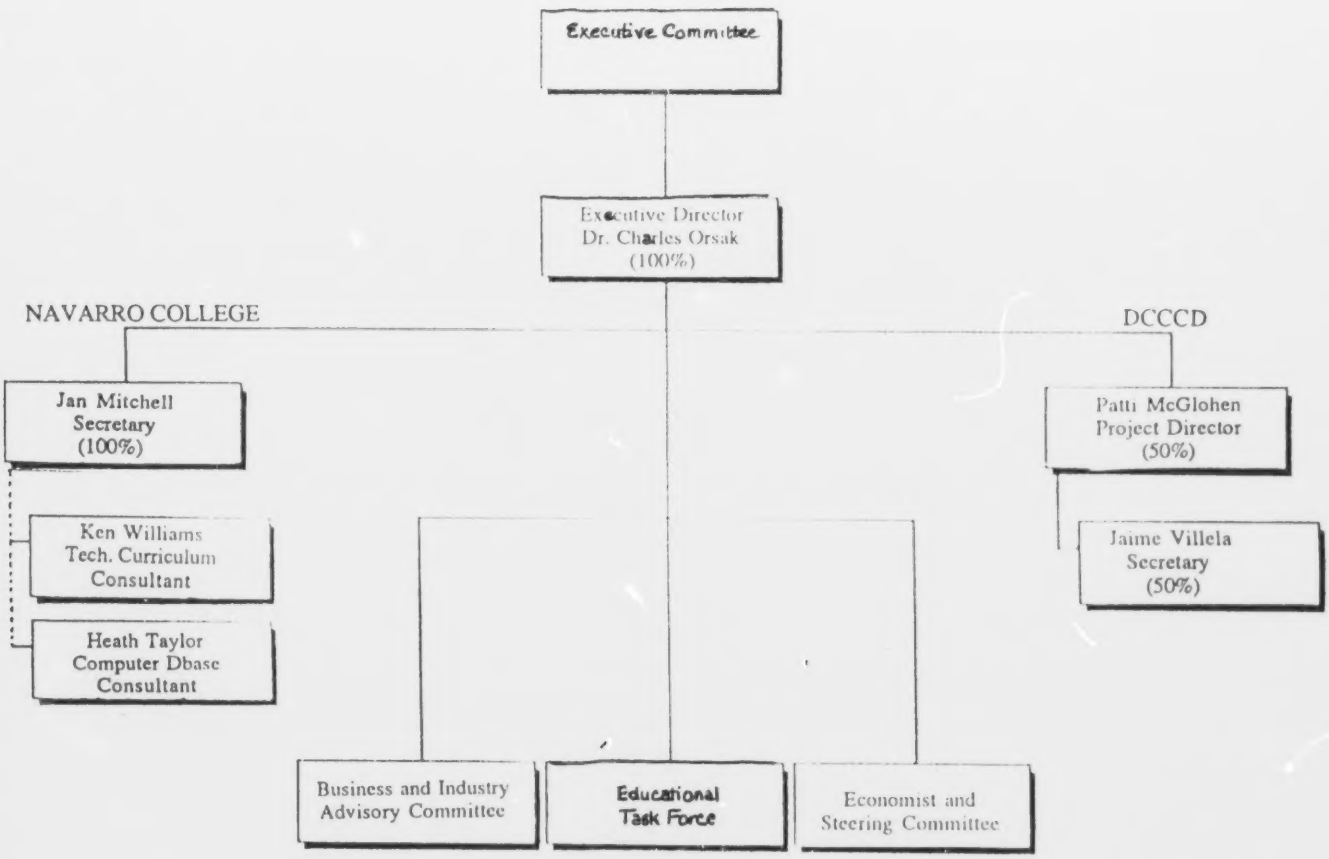
APPENDIX E

Organizational Charts

TEXAS HIGHER EDUCATION COORDINATING BOARD
GRANT APPLICATION
PROGRAM YEAR 1990 - 1991

PART D: METHODOLOGY FOR PROPOSAL

The Project Organizational Structure is charted below:



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The Texas Higher Education Coordinating Board

P.O. Box 12788; Austin, Texas 78711

Dr. Larry Key
Director of Federal Projects

Dr. Larry Johnson
Associate Program Director
of Federal Projects

Dr. Sally Andrade
Director of Research
and Program Planning

Eduardo Gayton, Associate
Program Director of Vocational
& Technical Programs

SSC Technical Training Grant
Executive Committee

Navarro College
3200 W. Seventh Avenue
Corsicana, TX 75110

Dr. Gerald Burson
President

Dr. Lary Reed
Executive Vice-President

Bill J. Priest Institute
1402 Corinth
Dallas, TX 75215

Dr. Glen Bounds
Provost

DCCCD
701 Elm Street
Dallas, TX 75202

Dr. Jack Stone, Vice Chancellor

Lyndon McClure, Director
of Resource Development

SSC Technical Training Project
Project Staff:

Dr. Charles Orsak
Executive Director

Patti McGlohen
DCCCD Coordinator

Jan Mitchell
Secretary

Jaime Villela
CCE Department Associate

Heath Taylor (Part-time)
Computer Database Consultant

Ken Williams (Part-time)
Technical Curriculum Consultant

SSC Technical Training Grant
Educational Task Force

Navarro College:
3200 W. Seventh Avenue
Corsicana, TX 75110

Dr. Lary Reed

Coy Grace

Bob McKenzie

Ken Williams

Louis Johnson

David Eishen
Cedar Valley College
3030 N. Dallas Avenue
Lancaster, TX 75134

Dr. Charles Humphreys
Paul Quinn College
3837 Simpson-Stuart Rd.
Dallas, TX 75241

Dr. Cecil Brewer, Dean of
Career & Continuing Education
Cedar Valley College
3030 N. Dallas Avenue
Lancaster, TX 75134

Dr. Floyd Elkins
President
Cedar Valley College
3030 N. Dallas Avenue
Lancaster, TX 75134

Exec. Director of Univ. of North Texas
Consortium - (open)

Celeste Guerro, DCCCD
Asst. District Director
Member of JTPA State Council

Allen Boehm, V.P. for
Instruction Research
and Development
Hill College
1505 Henderson
Cleburne, TX 76031

Dr. Curtis D. Johnson
University of Houston
College of Technology
Houston, TX 77204-4083

Dr. Robert Krienke
Vice Chancellor for
Educational Services
TSTI
3801 Campus Drive
Bldg. 32-01
Waco, TX 76705

Dr. Jerry King, Dean
of Occupational
Education
Trinity Valley
Community College
500 S. Prairieville
Athens, TX 75751

Dr. Faye Murphy
Tarrant County Jr.
College District
1500 Houston Street
Fort Worth, TX 76102-6599

Don Perry, Dean of
Career & Continuing Education
Mountainview College
4849 W. Illinois
Dallas, TX 75211

Business and Industry Advisory Committee

Lyssa Jenkens
NCTCOG
P.O. Drawer COG
Arlington, TX 76005-5888

Dr. Lynne Bowers, Director
Research & Education
TNRLC
1801 N. Hampton Rd.
Suite 400
Dallas, TX 75115

Dan Arguijo
Project Director
INTERLINK
8445 Freeport Pkwy.
Suite #640
Irving, TX 75063

Sam Webster, Manager of
Educational Affairs
Texas Instruments
P.O. Box 650311
M/S 3986
Dallas, TX 75265

Marcus Hickerson
Ellis County Planning & Zoning
201 Overhill
Waxahachie, TX 75165

General Dynamics (Open)

Westinghouse (Open)

Department of Commerce (Open)

Gary M. Burns
Navarro College Small Business
Development Center
120 N. 12th Street
Corsicana, TX 75110

Debbie Abrahamson
U.S. Dept. of Energy, Superconducting
Super Collider Project Office
1801 N. Hampton
Suite 310
DeSoto, TX 75115

N.B. "Buck" Jordan
Exec. Director
Chamber of Commerce
P.O. Box 187
Waxahachie, TX 75165

Judge Penny Redington
Ellis County Court House
Waxahachie, TX 75165

Sam Kivlighn, Manager
Educational Programs
External Affairs Office
SSC Laboratory
2550 Beckleymeade Ave.
Dallas, TX 75237

Dr. Thomas Gasden
Director of Education Programs
SSC Laboratory
2550 Beckleymeade Ave.
Dallas, TX 75237

Kenneth Heflin, Area Manager
Texas Employment Commission
105 Grand
Waxahachie, TX 75165

Governor's Office (Open)

JTPA Council (Open)

APPENDIX F

Objectives for Year Two

SSC Technical Training Project
FY 1992 Project #22140010

Project Objectives (First Quarter)

Between July 1, 1991 and September 30, 1991, the project will accomplish the following:

1. Revise budget and project timelines for Year Two, by quarters.

2. Convene advisory committee meeting #1 in August 1991 to:
   - A. present a demonstration of the database
   - B. present and finalize the curriculum development document/plan
   - C. identify, finalize, and prioritize the 3-5 curriculum areas/programs and delivery modes the project will concentrate on during Year Two, curriculum areas to be chosen from the following areas:
     1) magnet technology
     2) cryogenics
     3) vacuums
     4) CAD
     5) engineering tech
     6) secretarial/management support to include:
        a) Macintosh
        b) Excel
        c) Windows
        d) terminology, etc.
     7) detector technology
     8) construction trades
     9) general maintenance
     10) computer programming assistant
     11) composite materials
     12) protective services
   - D. approve the final report for Year One of the project.
   - E. discuss/confirm the objectives and timeline for Year Two
   - F. request a comparative study be done between Batavia and N. Central Texas to identify potential educational opportunities which will be made available to the area by the event of the SSC.
   - G. Set schedule for Year Two advisory/working committee meetings (At least once a quarter).

3. If approved by the advisory committee, prepare bid specs for a comparative study of the educational programs/trends in Batavia , Illinois, (College of DuPage, Argonne Laboratory, Fermi National Laboratory) and the educational projections for growth of the North Central Texas area based on the effects of a national research laboratory's establishment in these environs.

4. Advertise and hire a curriculum coordinator to address delivery modes for curriculum areas affected by the SSC in:
   - A. apprenticeship training programs
   - B. technical training programs
   - C. ESL for technicians, administrative/clerical, and visiting scientists
   - D. Adult/continuing education training programs

5. Print X copies of the validated data study for dissemination. (Number of copies to be determined by the advisory committee in August, in coordination with THECB).

6. Devise a plan for dissemination of Year One findings.

7. Devise a plan to pilot test the database.

8. Develop a plan to expand network.

SSC Technical Training Project
FY 1992 Project #22140010

Project Objectives (Second Quarter)

Between October 1, 1991 and December 31, 1991, the project will accomplish the following:

1. Convene advisory committee meeting #2 in October 1991 to:
   - A. identify resources for the DACUMs in the 3-5 curriculum areas.
   - B. review and finalize bids on the comparative study
   - C. perform the formative evaluation of the project to date
   - D. identify database pilot test users
   - E. finalize the plans to pilot test the database

2. Contract the comparative study.

3. Begin performing a DACUM on the 3-5 curriculum areas the project will concentrate on during Year Two, one of which will be to:

   help General Dynamics/Westinghouse, Hammond Technical Institute, Austin Community College, and Navarro College/Dallas County Community College District develop a curriculum to address the training needs of the magnet manufacturing plants/test facilities in Ellis County and Round Rock in Texas, and Hammond, Louisiana.

4 Make presentations and implement dissemination plan of the Year One findings (direct and indirect employment needs of the SSC Lab on the nine-county North Central Texas area, their impact on curricula of area schools, programs, and students).

5. Convene advisory committee meeting #3 in December to:
   - A. approve the DACUMs performed
   - B. discuss further DACUMs to be performed
   - C. perform the mid-year formative evaluation of the project

6. Begin the pilot test of the database among identified users

7. Continue and expand networking.

SSC Technical Training Project
FY 1992 Project #22140010

Project Objectives (Last Half)

Between January 1, 1992 and June 30, 1992, (the conclusion of Year Two) the project will:

1. Convene advisory committee meeting #4 in February 1992 to:
   - A. provide input for the model procedures manual which documents the process of addressing the community college's role when faced with a major economic impact
   - B. provide input and formatively evaluate the pilot test of the database
   - C. provide input and formatively evaluate the DACUMs held
   - D. provide input for final report of Year Two
   - E. discuss possibility and objectives for Year Three proposal
2. Produce DACUM charts and task matrices for the 3-5 curriculum areas developed during Year Two.
3. Finalize the comparison study.
4. Complete the pilot test of the database and revise the database according to user feedback.
5. Contribute to the update of the LMIS system based upon available 1990 census data.
6. Produce as a model for dissemination a procedures manual which documents the process of addressing the community college's role when faced with a major economic impact.
7. Write Year Three proposal and get approval from advisory committee to submit to THECB.
8. Continue presentations and dissemination of project findings and curricula developed.
9. Continue and expand networking.
10. Convene advisory committee meeting #5 in May 1992 (At the end of Year Two) to:
    - A. summatively evaluate Year Two
    - B. finalize and approve database and revisions
    - C. finalize and approve DACUM charts and task matrices of the 3-5 curriculum areas developed during Year Two
    - D. finalize and approve the comparison study
    - E. finalize and approve the model procedures manual
    - F. finalize and approve final report for Year Two
    - G. discuss objectives and plan for continuing the project into Year Three

Anticipated Year Three objectives (July 1, 1992 - June 30, 1993):

1. Pilot test, revise, and disseminate the 3-5 curricula identified and developed in Year Two.
2. Develop 3 additional programs (for a total of 6-8) from the original list prioritized by the advisory committee.
3. Develop equipment lists, student material, and teaching strategies for developed curriculum.
4. Disseminate via conferences and forums information about the curriculum model developed in this project to industry, educational institutions, and government agencies for their use and replication.
5. Implement clearinghouse of manpower needs, manpower supply, educational programs, and SSC curricula developed and/or identified by this project.
6. Disseminate thru conferences and workshops the model procedures manual which documents the process of addressing the community college's role when faced with a major economic impact.

APPENDIX G

Working Committee Objectives to be Accomplished Year Two

WORKING COMMITTEE
OBJECTIVES TO BE ACCOMPLISHED
YEAR TWO

1. Advisory Committee Meeting (Business and Industry) (August 29, 1991):
   - A. present a demonstration of the database
   - B. present and finalize the curriculum development document/plan
   - C. identify, finalize, and prioritize the 3-5 curriculum areas/programs and delivery modes the project will concentrate on during Year Two
   - D. approve the final report for Year One of the project
   - E. discuss/confirm the objectives and timeline for Year Two
   - F. request a comparative study be done between Batavia and N. Central Texas to identify potential educational opportunities which will be made available to the area by the event of the SSC
   - G. Set schedule for Year Two advisory committee meetings (At least once a quarter)
   - H. determined number of copies to be printed of validated data study
   - I. develop a plan to disseminate Year One findings
   - J. develop a plan to pilot test the database
   - K. develop a plan to expand network

2. Working Committee Meeting (Educational Institutions and Government Agencies) (October 1991)
   - A. identify resources for the DACUMs in the 3-5 curriculum areas.
   - B. review and finalize bids on the comparative study
   - C. perform the formative evaluation of the project to date
   - D. identify database pilot test users
   - E. finalize the plans to pilot test the database

3. Advisory Committee Meeting (December 1991):
   - A. approve the DACUMs performed
   - B. discuss further DACUMs to be performed
   - C. perform the mid-year formative evaluation of the project

4. Working Committee Meeting (February 1992):
   - A. provide input for the model procedures manual which documents the process of addressing the community college's role when faced with a major economic impact
   - B. provide input and formatively evaluate the pilot test of the database
   - C. provide input and formatively evaluate the DACUMs held
   - D. provide input for final report of Year Two
   - E. discuss possibility and objectives for Year Three proposal

5. Advisory Committee Meeting (May 1992 -At the end of Year Two):
   - A. summatively evaluate Year Two
   - B. finalize and approve database and revisions
   - C. finalize and approve DACUM charts and task matrices of the 3-5 curriculum areas developed during Year Two
   - D. finalize and approve the comparison study
   - E. finalize and approve the model procedures manual
   - F. finalize and approve final report for Year Two
   - G. discuss objectives and plan for continuing the project into Year Three

ERIC Clearinghouse for Junior Colleges
FEB 21 1992